

## Supporting Information

# Stereoselective Synthesis of Chiral Sultam-Fused Dihydropyridinones *via* Photopromoted NHC Catalyzed [4+2] Annulation

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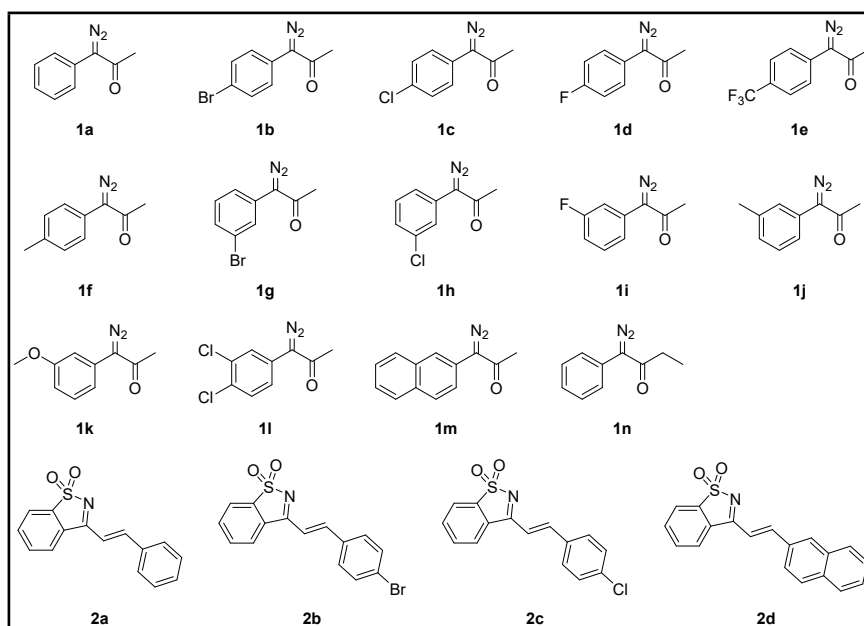
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## 1. General Methods and Materials

Unless otherwise mentioned, all reactions were carried out under an atmosphere of argon in dry glassware and were monitored by analytical thin-layer chromatography (TLC), which was visualized by ultraviolet light (254 nm). All solvents were obtained from commercial sources and were purified according to standard procedures. All syntheses and manipulations were carried out under a dry argon atmosphere. Purification of the products was accomplished by flash chromatography using silica gel (200-300 mesh). Melting points were determined in open capillaries and were uncorrected.  $^1\text{H}$  NMR spectra were measured on a 400 MHz spectrometer in  $\text{CDCl}_3$  (100 MHz,  $^{13}\text{C}$  NMR) or  $\text{DMSO}-d_6$  with chemical shift ( $\delta$ ) given in ppm relative to TMS as internal standard. Data were reported as follows: chemical shift, multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, m = multiple), coupling constants (Hz), integration. High-resolution mass spectra (HRMS) were measured with ESI in a positive mode. The ee value determination was carried out using chiral HPLC with Chiralpak AD-H, IA and OD-H column on Agilent 1100 with a UV-detector.

Saccharine-derived 1-azadienes<sup>1</sup> **1** and  $\alpha$ -diazoketones<sup>2, 3</sup> **2** were prepared according to literatures, respectively.

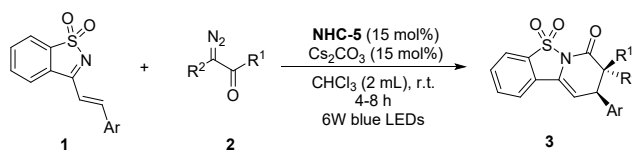


## 2. References

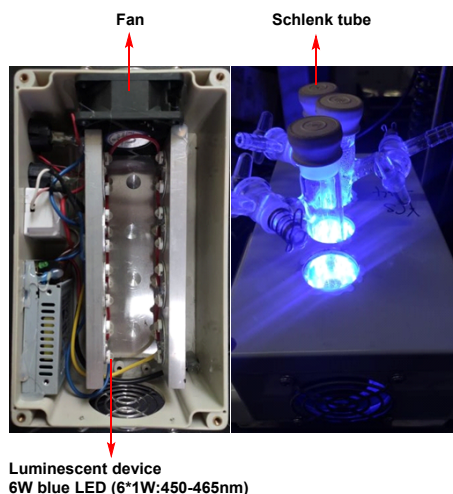
1. X. Feng, Z. Zhou, C. Ma, X. Yin, R. Li, L. Dong and Y.-C. Chen, Trienamines Derived from Interrupted Cyclic 2,5-Dienones: Remote  $\delta,\epsilon$ -C-C Bond Activation for Asymmetric Inverse-Electron-Demand Aza-Diels–Alder Reaction, *Angew. Chem. Int. Ed.*, 2013, **52**, 14173-14176.
2. B. Xu, S.-F. Zhu, X.-D. Zuo, Z.-C. Zhang and Q.-L. Zhou, Enantioselective N-H Insertion Reaction of  $\alpha$ -Aryl  $\alpha$ -Diazoketones: An Efficient Route to Chiral  $\alpha$ -Aminoketones, *Angew. Chem. Int. Ed.*, 2014, **53**, 3913-3916.
3. Q. Lu, S. Mondal, S. Cembellín and F. Glorius, MnI/AgI Relay Catalysis: Traceless Diazo-Assisted C(sp<sup>2</sup>)–H/C(sp<sup>3</sup>)–H Coupling to  $\beta$ -(Hetero)Aryl/Alkenyl Ketones, *Angew. Chem. Int. Ed.*, 2018, **57**, 10732-10736.

## 3. General Procedures for the Synthesis of Products

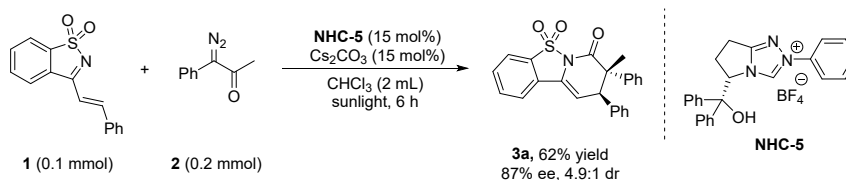
### 3.1 General procedure for the synthesis of products 3



A dried and argon-filled Schlenk tube was charged with saccharine-derived 1-azadienes **1** (0.10 mmol),  $\alpha$ -diazoketones **2** (0.20 mmol, 2.0 equiv.), **NHC-5** (0.015 mmol, 6.8 mg), and Cs<sub>2</sub>CO<sub>3</sub> (0.015 mmol, 4.9 mg) in dry CHCl<sub>3</sub> (2 mL). The reaction mixture was stirred under the irradiation of 6W blue LEDs at room temperature until the consumption of saccharine-derived 1-azadienes **1** as monitored by TLC. The solvent was removed in vacuo and the residue was purified by chromatography on silica gel using PE/EA (10:1) as eluent to afford the desired products **3**.



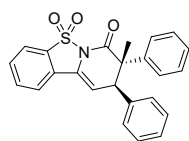
### 3.2 Procedure of the sunlight reaction



An oven-dried 10 mL Schlenk tube equipped with a magnetic stir bar was charged with 1-azadienes **1** (0.1 mmol, 1.0 eq.),  $\alpha$ -diazoketones **2** (0.2 mmol, 2.0 eq.), **NHC-5** (0.015 mmol, 6.8 mg), and  $\text{Cs}_2\text{CO}_3$  (0.015 mmol, 4.9 mg) in dry  $\text{CHCl}_3$  (2 mL) under Ar and irradiation of sunlight, after 6 h of stirring at room temperature until the reaction was completed, as monitored by TLC analysis. The product **3** was purified by flash column chromatography on silica gel (PE/EA=10/1).

### 4. Characterization Data of Products

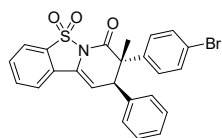
**(8*S*,9*R*)-8-methyl-8,9-diphenyl-8,9-dihydro-7*H*-benzo[4,5]isothiazolo[2,3-*a*]pyridin-7-one 5,5-dioxide (3a).**



White solid (28.1 mg, 70% yield); mp 194.7 – 196.5 °C;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.96 – 7.78 (m, 1H, major + minor), 7.77 – 7.64 (m, 1H, major + minor), 7.63 – 7.54 (m, 2H, major + minor), 7.49 – 7.42 (m, 2H, major + minor), 7.36 – 7.27 (m, 4H, major + minor), 7.24 – 7.17 (m, 2H, major + minor), 7.16 – 7.03 (m, 1H, major + minor), 6.83 – 6.71 (m, 1H, major + minor), 6.15 (d,  $J$  = 6.1 Hz, 0.82H, major), 6.06 (d,  $J$  = 3.9 Hz, 0.2H, minor), 4.30 (d,  $J$  = 6.1 Hz, 0.83H, major), 4.01 (d,  $J$  = 3.8 Hz, 0.18H, minor), 1.84 (s, 0.52H, minor), 1.30 (s, 2.42H, major).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (major) 169.9, 141.9, 137.5, 133.9, 132.7, 130.8, 129.1, 128.8, 128.7, 128.0, 127.9, 127.6, 126.5, 125.8, 121.7, 121.5, 106.6, 52.7, 50.4, 23.3. HRMS (ESI)  $m/z$  calcd for  $[\text{M} + \text{Na}]^+$   $\text{C}_{24}\text{H}_{19}\text{NNaO}_3\text{S}$ : 424.0978; found: 424.0972; HPLC (Daicel Chiralpak IA column, *n*-hexane/*i*-PrOH = 70/30, flow rate = 1.0

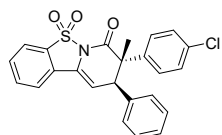
mL/min, 254 nm, 25 °C, retention time:  $t_{\text{major}} = 14.923$  min,  $t_{\text{minor}} = 36.160$  min, 95% ee; 9.8:1 dr).

**(8*S*,9*R*)-8-(4-bromophenyl)-8-methyl-9-phenyl-8,9-dihydro-7*H*-benzo[4,5]isothiazolo[2,3-*a*]pyridin-7-one 5,5-dioxide (3b).**



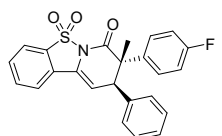
White solid (35.9 mg, 75% yield); mp 224.2 – 225.1 °C; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  7.82 (d,  $J = 7.7$  Hz, 1H), 7.70 – 7.55 (m, 3H), 7.48 – 7.40 (m, 2H), 7.34 – 7.27 (m, 5H), 7.23 – 7.11 (m, 2H), 6.17 (d,  $J = 6.1$  Hz, 1H), 4.24 (d,  $J = 6.0$  Hz, 1H), 1.29 (s, 3H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  169.5, 140.9, 137.1, 134.0, 132.6, 131.9, 130.9, 129.2, 129.1, 128.7, 128.2, 127.8, 126.3, 121.7, 121.6, 121.5, 106.4, 52.4, 50.2, 22.9. HRMS (ESI)  $m/z$  calcd for [M + Na]<sup>+</sup> C<sub>24</sub>H<sub>18</sub>BrNNaO<sub>3</sub>S: 502.0083; found: 502.0081; HPLC (Daicel Chiralpak IA column, *n*-hexane/*i*-PrOH = 80/20, flow rate = 1.0 mL/min, 254 nm, 25 °C, retention time:  $t_{\text{major}} = 20.663$  min,  $t_{\text{minor}} = 42.583$  min, 97% ee; 15.3:1 dr).

**(8*S*,9*R*)-8-(4-chlorophenyl)-8-methyl-9-phenyl-8,9-dihydro-7*H*-benzo[4,5]isothiazolo[2,3-*a*]pyridin-7-one 5,5-dioxide (3c).**



White solid (34.8 mg, 80% yield); mp 149.3 – 150.7 °C; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  7.85 (d,  $J = 7.6$  Hz, 1H), 7.70 – 7.57 (m, 3H), 7.40 – 7.27 (m, 7H), 7.20 – 7.13 (m, 2H), 6.16 (d,  $J = 5.8$  Hz, 1H), 4.24 (d,  $J = 6.0$  Hz, 1H), 1.30 (s, 3H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  169.5, 140.3, 137.1, 134.0, 133.5, 132.7, 131.0, 129.2, 129.1, 129.0, 128.7, 128.2, 127.5, 126.3, 121.7, 121.6, 106.3, 52.4, 50.4, 23.0. HRMS (ESI)  $m/z$  calcd for [M + Na]<sup>+</sup> C<sub>24</sub>H<sub>18</sub>ClNNaO<sub>3</sub>S: 458.0588; found: 458.0582; HPLC (Daicel Chiralpak IA column, *n*-hexane/*i*-PrOH = 80/20, flow rate = 1.0 mL/min, 254 nm, 25 °C, retention time:  $t_{\text{major}} = 22.913$  min,  $t_{\text{minor}} = 49.327$  min, 98% ee; 9.8:1 dr).

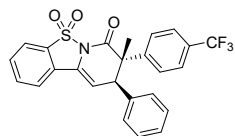
**(8*S*,9*R*)-8-(4-fluorophenyl)-8-methyl-9-phenyl-8,9-dihydro-7*H*-benzo[4,5]isothiazolo[2,3-*a*]pyridin-7-one 5,5-dioxide (3d).**



White solid (28.4 mg, 68% yield); mp 129.1 – 130.4 °C; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  7.95 – 7.81 (m, 1H), 7.77 – 7.57 (m, 3H), 7.44 – 7.36 (m, 2H), 7.35 – 7.28 (m, 3H), 7.20 – 7.12 (m, 2H), 7.06 – 6.97 (m, 2H), 6.16 (d,  $J = 5.8$  Hz, 1H), 4.24 (d,  $J = 5.9$  Hz, 1H), 1.31 (s, 3H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  169.7, 161.9, (d,  $J_{\text{C-F}} = 245.8$  Hz), 137.5 (d,  $J_{\text{C-F}} = 3.3$  Hz), 137.3, 134.0, 132.7, 130.9, 129.2, 129.1, 128.7, 128.2, 127.8 (d,  $J_{\text{C-F}} = 7.9$  Hz), 126.4, 121.6, 115.7 (d,  $J_{\text{C-F}} = 21.2$  Hz), 106.3, 52.2, 50.6, 23.1. <sup>19</sup>F NMR (376 MHz, CDCl<sub>3</sub>)  $\delta$  -114.6. HRMS (ESI)  $m/z$  calcd for [M + Na]<sup>+</sup> C<sub>24</sub>H<sub>18</sub>FNNaO<sub>3</sub>S: 442.0884; found: 442.0880; HPLC (Daicel Chiralpak IA column, *n*-hexane/*i*-PrOH = 80/20, flow rate = 1.0 mL/min, 254 nm, 25 °C, retention time:  $t_{\text{major}} = 17.923$  min,  $t_{\text{minor}} = 40.783$  min, 90% ee; 11.9:1 dr).

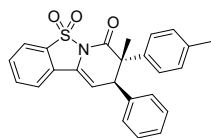
**(8*S*,9*R*)-8-methyl-9-phenyl-8-(4-(trifluoromethyl)phenyl)-8,9-dihydro-7*H*-**

**benzo[4,5]isothiazolo[2,3-*a*]pyridin-7-one 5,5-dioxide (3e).**



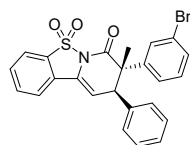
White solid (33.3 mg, 71% yield); mp 197.4 – 198.1 °C; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.96 – 7.82 (m, 1.03H, major), 7.79 – 7.52 (m, 6.83H, major), 7.44 – 7.28 (m, 3H, major + minor), 7.22 – 7.11 (m, 2H, major + minor), 6.95 (d, *J* = 8.6 Hz, 0.26H, minor), 6.74 (d, *J* = 7.6 Hz, 0.23H, minor), 6.17 (d, *J* = 6.0 Hz, 0.87H, major), 6.11 (d, *J* = 4.4 Hz, 0.14H, minor), 4.30 (d, *J* = 6.0 Hz, 0.87H, major), 3.99 (d, *J* = 4.3 Hz, 0.13H, minor), 1.90 (s, 0.39H, minor), 1.33 (s, 2.62H, major). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ (major) 169.3, 145.9, 136.9, 134.1, 132.7, 131.0, 130.0 (t, *J*<sub>C-F</sub> = 32.4 Hz), 129.4, 129.3, 129.2, 128.7, 128.3, 126.5, 126.3, 125.8 (q, *J*<sub>C-F</sub> = 3.7 Hz), 121.7, 121.6, 106.2, 52.8, 50.4, 22.9. <sup>19</sup>F NMR (376 MHz, CDCl<sub>3</sub>) δ -62.6. HRMS (ESI) *m/z* calcd for [M + Na]<sup>+</sup> C<sub>25</sub>H<sub>18</sub>F<sub>3</sub>NNaO<sub>3</sub>S: 492.0852; found: 492.0852; HPLC (Daicel Chiralpak AD-H column, *n*-hexane/*i*-PrOH = 80/20, flow rate = 1.0 mL/min, 254 nm, 25 °C, retention time: *t*<sub>major</sub> = 25.383 min, *t*<sub>minor</sub> = 23.490 min, 90% ee; 5.3:1 dr).

**(8*S*,9*R*)-8-methyl-9-phenyl-8-(*p*-tolyl)-8,9-dihydro-7*H*-benzo[4,5]isothiazolo[2,3-*a*]pyridin-7-one 5,5-dioxide (3f).**



White solid (29.1 mg, 70% yield); mp 191.7 – 192.3 °C; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.94 – 7.78 (m, 1H, major + minor), 7.76 – 7.53 (m, 3H, major + minor), 7.38 – 7.27 (m, 4H, major + minor), 7.24 – 7.17 (m, 2H, major + minor), 7.16 – 7.10 (m, 2H, major + minor), 6.91 – 6.65 (m, 1H, major + minor), 6.15 (d, *J* = 6.2 Hz, 0.85H, major), 6.04 (d, *J* = 3.9 Hz, 0.12H, minor), 4.27 (d, *J* = 6.2 Hz, 0.87H, major), 4.01 (d, *J* = 4.0 Hz, 0.13H, minor), 2.28 (s, 2.53H, major), 2.22 (s, 0.43H, minor), 1.81 (s, 0.33H, minor), 1.28 (s, 2.59H, major). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ (major) 170.0, 138.9, 137.7, 137.3, 133.9, 132.7, 130.7, 129.5, 129.1, 128.7, 128.0, 127.2, 126.5, 125.7, 121.6, 121.5, 106.7, 52.4, 50.3, 23.5, 20.9. HRMS (ESI) *m/z* calcd for [M + Na]<sup>+</sup> C<sub>25</sub>H<sub>21</sub>NNaO<sub>3</sub>S: 438.1134; found: 438.1129; HPLC (Daicel Chiralpak AD-H column, *n*-hexane/*i*-PrOH = 75/25, flow rate = 1.0 mL/min, 254 nm, 25 °C, retention time: *t*<sub>major</sub> = 17.540 min, *t*<sub>minor</sub> = 27.380 min, 88% ee; 3.6:1 dr).

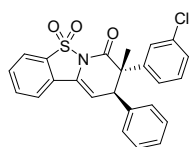
**(8*S*,9*R*)-8-(3-bromophenyl)-8-methyl-9-phenyl-8,9-dihydro-7*H*-benzo[4,5]isothiazolo[2,3-*a*]pyridin-7-one 5,5-dioxide (3g).**



White solid (33.1 mg, 69% yield); mp 87.5 – 88.3 °C; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.95 – 7.80 (m, 1H, major + minor), 7.78 – 7.54 (m, 4H, major + minor), 7.50 – 7.12 (m, 7H, major + minor), 6.99 – 6.71 (m, 1H, major +

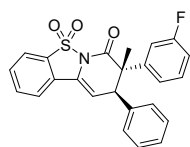
minor), 6.16 (d,  $J = 6.0$  Hz, 0.81H, major), 6.11 (d,  $J = 4.5$  Hz, 0.19H, minor), 4.24 (d,  $J = 6.1$  Hz, 0.84H, major), 3.94 (d,  $J = 4.5$  Hz, 0.19H, minor), 1.85 (s, 0.53H, minor), 1.30 (s, 2.53H, major).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (major) 169.3, 144.2, 137.0, 134.0, 132.7, 131.0, 130.9, 130.4, 129.2, 129.1, 129.0, 128.7, 128.2, 126.3, 124.8, 122.9, 121.7, 121.6, 106.2, 52.6, 50.3, 23.0. HRMS (ESI)  $m/z$  calcd for  $[\text{M} + \text{Na}]^+ \text{C}_{24}\text{H}_{18}\text{BrNNaO}_3\text{S}$ : 502.0083; found: 502.0081; HPLC (Daicel Chiralpak AD-H column, *n*-hexane/*i*-PrOH = 80/20, flow rate = 1.0 mL/min, 254 nm, 25 °C, retention time:  $t_{\text{major}} = 28.697$  min,  $t_{\text{minor}} = 66.607$  min, 91% ee; 6.5:1 dr).

**(8*S*,9*R*)-8-(3-chlorophenyl)-8-methyl-9-phenyl-8,9-dihydro-7*H*-benzo[4,5]isothiazolo[2,3-*a*]pyridin-7-one 5,5-dioxide (3h).**



White solid (33.4 mg, 77% yield); mp 102.6 – 103.6 °C;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.95 – 7.80 (m, 1H), 7.78 – 7.57 (m, 3H), 7.45 – 7.40 (m, 1H), 7.35 – 7.27 (m, 4H), 7.25 – 7.12 (m, 4H), 6.17 (d,  $J = 6.0$  Hz, 1H), 4.25 (d,  $J = 6.0$  Hz, 1H), 1.30 (s, 3H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  169.3, 143.9, 137.0, 134.7, 134.0, 132.7, 131.0, 130.2, 129.3, 129.1, 128.7, 128.2, 127.9, 126.4, 126.2, 124.4, 121.7(1), 121.6(7), 106.2, 52.6, 50.4, 23.0. HRMS (ESI)  $m/z$  calcd for  $[\text{M} + \text{Na}]^+ \text{C}_{24}\text{H}_{18}\text{ClNNaO}_3\text{S}$ : 458.0588; found: 458.0581; HPLC (Daicel Chiralpak AD-H column, *n*-hexane/*i*-PrOH = 75/25, flow rate = 1.0 mL/min, 254 nm, 25 °C, retention time:  $t_{\text{major}} = 19.817$  min,  $t_{\text{minor}} = 47.400$  min, 98% ee; 16.5:1 dr).

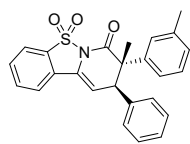
**(8*S*,9*R*)-8-(3-fluorophenyl)-8-methyl-9-phenyl-8,9-dihydro-7*H*-benzo[4,5]isothiazolo[2,3-*a*]pyridin-7-one 5,5-dioxide (3i).**



White solid (31.8 mg, 76% yield); mp 108.7 – 109.4 °C;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.96 – 7.81 (m, 1H, major + minor), 7.78 – 7.57 (m, 3H, major + minor), 7.37 – 7.11 (m, 7H, major + minor), 7.11 – 6.91 (m, 1H, major + minor), 6.89 – 6.47 (m, 1H, major + minor), 6.17 (d,  $J = 6.0$  Hz, 0.85H, major), 6.09 (d,  $J = 4.3$  Hz, 0.17H, minor), 4.24 (d,  $J = 6.1$  Hz, 0.85H, major), 3.98 (d,  $J = 4.4$  Hz, 0.16H, minor), 1.85 (s, 0.49H, minor), 1.31 (s, 2.53H, major).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (major) 169.4, 162.8 (d,  $J_{\text{C-F}} = 245.0$  Hz), 144.4 (d,  $J_{\text{C-F}} = 6.9$  Hz), 137.1, 134.0, 132.7, 130.9, 130.4 (d,  $J_{\text{C-F}} = 8.3$  Hz), 129.2, 129.1, 128.7, 128.2, 126.4, 121.8 (d,  $J_{\text{C-F}} = 2.9$  Hz), 121.7, 121.6, 114.7 (d,  $J_{\text{C-F}} = 20.8$  Hz), 113.4 (d,  $J_{\text{C-F}} = 22.9$  Hz), 106.3, 52.6, 50.4, 23.0.  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -111.6. HRMS (ESI)  $m/z$  calcd for  $[\text{M} + \text{Na}]^+ \text{C}_{24}\text{H}_{18}\text{FNNaO}_3\text{S}$ : 442.0884; found: 442.0884; HPLC (Daicel Chiralpak IA column, *n*-hexane/*i*-PrOH = 80/20, flow rate = 1.0 mL/min, 254 nm, 25 °C, retention time:  $t_{\text{major}} = 19.560$  min,  $t_{\text{minor}} = 58.523$  min, 90% ee; 6.1:1 dr).

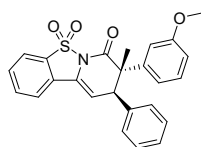
**(8*S*,9*R*)-8-methyl-9-phenyl-8-(*m*-tolyl)-8,9-dihydro-7*H*-benzo[4,5]isothiazolo[2,3-*a*]pyridin-7-**

**one 5,5-dioxide (3j).**



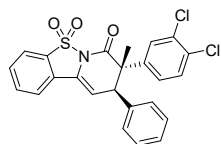
White solid (30.3 mg, 73% yield); mp 97.7 – 98.6 °C; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.95 – 7.78 (m, 1H), 7.75 – 7.52 (m, 3H), 7.36 – 7.11 (m, 8H), 7.09 – 6.92 (m, 1H), 6.14 (d, *J* = 6.2 Hz, 1H), 4.29 (d, *J* = 6.2 Hz, 1H), 2.32 (s, 3H), 1.29 (s, 3H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 170.0, 142.0, 138.5, 137.6, 133.9, 132.7, 130.7, 129.8, 129.1, 128.7, 128.6, 128.4, 128.0, 126.5(3), 126.5(1), 122.7, 121.7, 121.5, 106.7, 52.7, 50.4, 23.5, 21.6. HRMS (ESI) *m/z* calcd for [M + Na]<sup>+</sup> C<sub>25</sub>H<sub>21</sub>NNaO<sub>3</sub>S: 438.1134; found: 438.1129; HPLC (Daicel Chiralpak OD-H column, *n*-hexane/*i*-PrOH = 80/20, flow rate = 1.0 mL/min, 254 nm, 25 °C, retention time: *t*<sub>major</sub> = 13.893 min, *t*<sub>minor</sub> = 40.057 min, 89% ee; 9.1:1 dr).

**(8S,9R)-8-(3-methoxyphenyl)-8-methyl-9-phenyl-8,9-dihydro-7H-benzo[4,5]isothiazolo[2,3-a]pyridin-7-one 5,5-dioxide (3k).**



White solid (30.6 mg, 71% yield); mp 81.9 – 82.5 °C; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.94 – 7.80 (m, 1H, major + minor), 7.76 – 7.54 (m, 3H, major + minor), 7.36 – 7.14 (m, 6H, major + minor), 7.10 – 6.96 (m, 2H, major + minor), 6.83 – 6.66 (m, 1H, major + minor), 6.14 (d, *J* = 6.4 Hz, 0.88H, major), 6.06 (d, *J* = 3.9 Hz, 0.12H, minor), 4.28 (d, *J* = 6.2 Hz, 0.9H, major), 4.01 (d, *J* = 3.9 Hz, 0.1H, minor), 3.76 (s, 2.71H, major), 3.49 (s, 0.33H, minor), 1.83 (s, 0.28H, minor), 1.29 (s, 2.81H, major). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ (major) 169.8, 159.8, 143.7, 137.5, 133.9, 132.8, 130.8, 129.8, 129.1, 128.7, 128.1, 128.0, 126.5, 121.7, 121.6, 118.0, 113.0, 111.8, 106.6, 55.3, 52.8, 50.5, 23.5. HRMS (ESI) *m/z* calcd for [M + Na]<sup>+</sup> C<sub>25</sub>H<sub>21</sub>NNaO<sub>4</sub>S: 454.1084; found: 454.1080; HPLC (Daicel Chiralpak IA column, *n*-hexane/*i*-PrOH = 80/20, flow rate = 1.0 mL/min, 254 nm, 25 °C, retention time: *t*<sub>major</sub> = 23.523 min, *t*<sub>minor</sub> = 31.207 min, 94% ee; 11.2:1 dr).

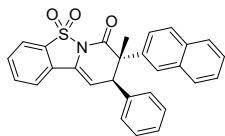
**(8S,9R)-8-(3,4-dichlorophenyl)-8-methyl-9-phenyl-8,9-dihydro-7H-benzo[4,5]isothiazolo[2,3-a]pyridin-7-one 5,5-dioxide (3l).**



White solid (31.4 mg, 67% yield); mp 90.3 – 91.5 °C; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.85 (d, *J* = 7.7 Hz, 1H), 7.73 – 7.58 (m, 3H), 7.51 (d, *J* = 2.3 Hz, 1H), 7.44 – 7.22 (m, 5H), 7.19 – 7.12 (m, 2H), 6.18 (d, *J* = 5.8 Hz, 1H), 4.22 (d, *J* = 5.8 Hz, 1H), 1.30 (s, 3H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 169.0, 142.0, 136.7, 134.1, 132.9, 132.6, 131.9, 131.1, 130.7, 129.3, 129.2, 128.7, 128.3, 128.2, 126.2, 125.8, 121.7(5), 121.6(8), 106.0, 52.3, 50.2, 22.7. HRMS (ESI) *m/z* calcd for [M + Na]<sup>+</sup> C<sub>24</sub>H<sub>17</sub>Cl<sub>2</sub>NNaO<sub>3</sub>S: 492.0198; found: 492.0195; HPLC (Daicel Chiralpak AD-H column, *n*-hexane/*i*-PrOH = 75/25, flow rate = 1.0 mL/min, 254 nm, 25 °C, retention time: *t*<sub>major</sub> = 16.457 min, *t*<sub>minor</sub> = 22.213 min, 99% ee; >20:1 dr).

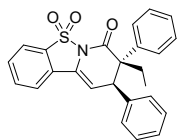


**(8*S*,9*R*)-8-methyl-8-(naphthalen-2-yl)-9-phenyl-8,9-dihydro-7*H*-benzo[4,5]isothiazolo[2,3-*a*]pyridin-7-one 5,5-dioxide (3m).**



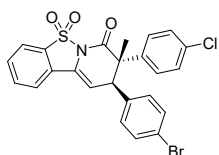
White solid (32.0 mg, 71% yield); mp 212.5 – 213.8 °C; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.98 – 7.94 (m, 0.23H, minor), 7.88 – 7.65 (m, 5H, major + minor), 7.64 – 7.52 (m, 3H, major + minor), 7.51 – 7.28 (m, 5H, major + minor), 7.25 – 7.15 (m, 1H, major + minor), 7.12 – 6.99 (m, 1H, major + minor), 6.80 – 6.73 (m, 0.61H, major), 6.17 (d, *J* = 6.2 Hz, 0.77H, major), 6.09 (d, *J* = 4.2 Hz, 0.2H, minor), 4.44 (d, *J* = 6.2 Hz, 0.77H, major), 4.07 (d, *J* = 4.0 Hz, 0.24H, minor), 1.96 (s, 0.59H, minor), 1.39 (s, 2.24H, major). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ (major) 170.0, 139.2, 137.5, 133.9, 133.1, 132.7, 132.5, 130.8, 129.8, 129.2, 128.8, 128.7, 128.3, 128.1, 128.0, 127.4, 126.3, 125.8, 124.9, 123.8, 121.7, 121.6, 106.5, 52.9, 50.3, 23.2. HRMS (ESI) *m/z* calcd for [M + Na]<sup>+</sup> C<sub>28</sub>H<sub>21</sub>NNaO<sub>3</sub>S: 474.1134; found: 474.1131; HPLC (Daicel Chiralpak AD-H column, *n*-hexane/*i*-PrOH = 75/25, flow rate = 1.0 mL/min, 254 nm, 25 °C, retention time: *t*<sub>major</sub> = 32.080 min, *t*<sub>minor</sub> = 51.340 min, 93% ee; 7.0:1 dr).

**(8*S*,9*R*)-8-ethyl-8,9-diphenyl-8,9-dihydro-7*H*-benzo[4,5]isothiazolo[2,3-*a*]pyridin-7-one 5,5-dioxide (3n).**



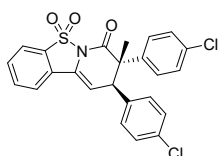
White solid (27.4 mg, 66% yield); mp 86.7 – 87.3 °C; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.95 – 7.89 (m, 0.41H, minor), 7.82 – 7.71 (m, 1H, major + minor), 7.70 – 7.51 (m, 2H, major + minor), 7.46 - 7.39 (m, 1H, major + minor), 7.39 – 7.20 (m, 6H, major + minor), 7.14 – 7.01 (m, 2H, major + minor), 6.98 – 6.92 (m, 1H, major + minor), 6.73 - 6.67 (m, 0.6H, major), 6.20 (d, *J* = 6.2 Hz, 0.68H, major), 6.16 (d, *J* = 5.4 Hz, 0.38H, minor), 4.35 (d, *J* = 6.4 Hz, 0.68H, major), 3.90 (d, *J* = 5.4 Hz, 0.39H, minor), 2.50 – 2.33 (m, 0.65H, minor), 1.66 – 1.48 (m, 1.33H, major), 1.05 (t, *J* = 7.2 Hz, 0.94H, minor), 0.59 (t, *J* = 7.3 Hz, 2.04H, major). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ (major + minor) 169.8, 168.5, 166.5, 138.1, 137.9, 137.7, 136.2, 134.1, 133.8, 132.8, 132.7, 130.9, 130.6, 129.2, 128.8, 128.7, 128.6(1), 128.5(8), 128.5, 128.3, 128.2, 128.0, 127.6(5), 127.5(8), 127.4, 127.1, 126.8, 126.6, 126.3, 121.8, 121.6, 121.5, 107.0, 106.3, 57.5, 55.9, 52.9, 47.3, 29.1, 27.1, 9.3, 8.2. HRMS (ESI) *m/z* calcd for [M + Na]<sup>+</sup> C<sub>25</sub>H<sub>21</sub>NNaO<sub>3</sub>S: 438.1143; found: 438.1134; HPLC (Daicel Chiralpak OD-H column, *n*-hexane/*i*-PrOH = 80/20, flow rate = 1.0 mL/min, 254 nm, 25 °C, retention time: *t*<sub>major</sub> = 10.970 min, *t*<sub>minor</sub> = 27.817 min, 89% ee; 3.5:1 dr).

**(8*S*,9*R*)-9-(4-bromophenyl)-8-(4-chlorophenyl)-8-methyl-8,9-dihydro-7*H*-benzo[4,5]isothiazolo[2,3-*a*]pyridin-7-one 5,5-dioxide (3o).**



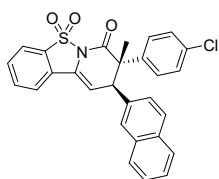
White solid (35.8 mg, 70% yield); mp 234.6 – 235.3 °C; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.86 (d, *J* = 8.3 Hz, 1H), 7.72 – 7.59 (m, 3H), 7.44 (d, *J* = 8.4 Hz, 2H), 7.36 – 7.28 (m, 4H), 7.02 (d, *J* = 8.4 Hz, 2H), 6.11 (d, *J* = 5.9 Hz, 1H), 4.22 (d, *J* = 5.7 Hz, 1H), 1.30 (s, 3H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 169.2, 139.9, 136.1, 134.1, 133.7, 132.8, 132.2, 131.2, 130.4, 129.6, 129.0, 128.8, 127.5, 126.1, 122.2, 121.7, 105.5, 52.2, 49.8, 22.7. HRMS (ESI) *m/z* calcd for [M + Na]<sup>+</sup> C<sub>24</sub>H<sub>17</sub>BrClNNaO<sub>3</sub>S: 535.9693; found: 535.9694; HPLC (Daicel Chiralpak IA column, *n*-hexane/*i*-PrOH = 80/20, flow rate = 1.0 mL/min, 254 nm, 25 °C, retention time: *t*<sub>major</sub> = 27.290 min, *t*<sub>minor</sub> = 37.370 min, 95% ee; >20:1 dr).

**(8*S*,9*R*)-8,9-bis(4-chlorophenyl)-8-methyl-8,9-dihydro-7*H*-benzo[4,5]isothiazolo[2,3-*a*]pyridin-7-one 5,5-dioxide (3p).**



White solid (31.9 mg, 68% yield); mp 237.6 – 238.9 °C; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.85 (d, *J* = 7.7 Hz, 1H), 7.72 – 7.59 (m, 3H), 7.36 – 7.27 (m, 6H), 7.08 (d, *J* = 8.1 Hz, 2H), 6.12 (d, *J* = 5.8 Hz, 1H), 4.23 (d, *J* = 5.8 Hz, 1H), 1.30 (s, 3H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 169.3, 139.9, 135.6, 134.1, 133.6, 132.7, 131.1, 130.1, 129.5, 129.2, 129.0, 128.8, 127.5, 126.2, 121.7(2), 121.6(7), 105.6, 52.3, 49.7, 22.6. HRMS (ESI) *m/z* calcd for [M + Na]<sup>+</sup> C<sub>24</sub>H<sub>17</sub>Cl<sub>2</sub>NNaO<sub>3</sub>S: 492.0198; found: 492.0195; HPLC (Daicel Chiralpak IA column, *n*-hexane/*i*-PrOH = 80/20, flow rate = 1.0 mL/min, 254 nm, 25 °C, retention time: *t*<sub>major</sub> = 24.933 min, *t*<sub>minor</sub> = 34.830 min, 95% ee; >20:1 dr).

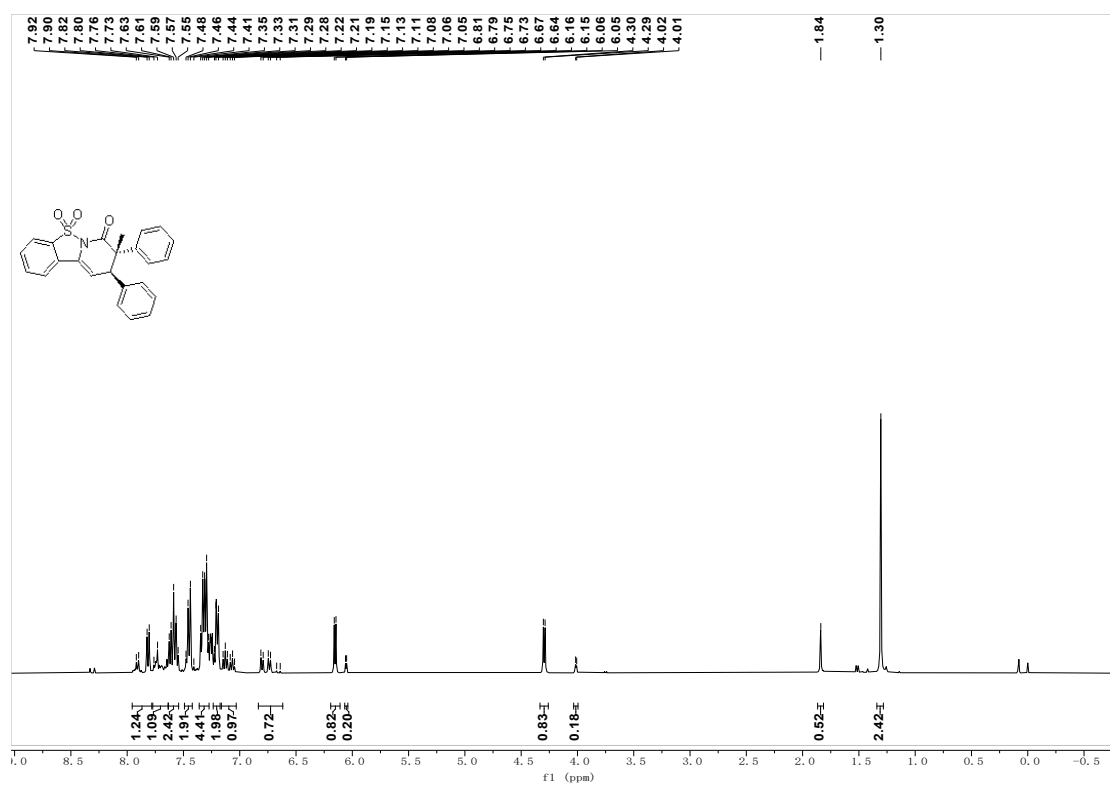
**(8*S*,9*R*)-8-(4-chlorophenyl)-8-methyl-9-(naphthalen-2-yl)-8,9-dihydro-7*H*-benzo[4,5]isothiazolo[2,3-*a*]pyridin-7-one 5,5-dioxide (3q).**



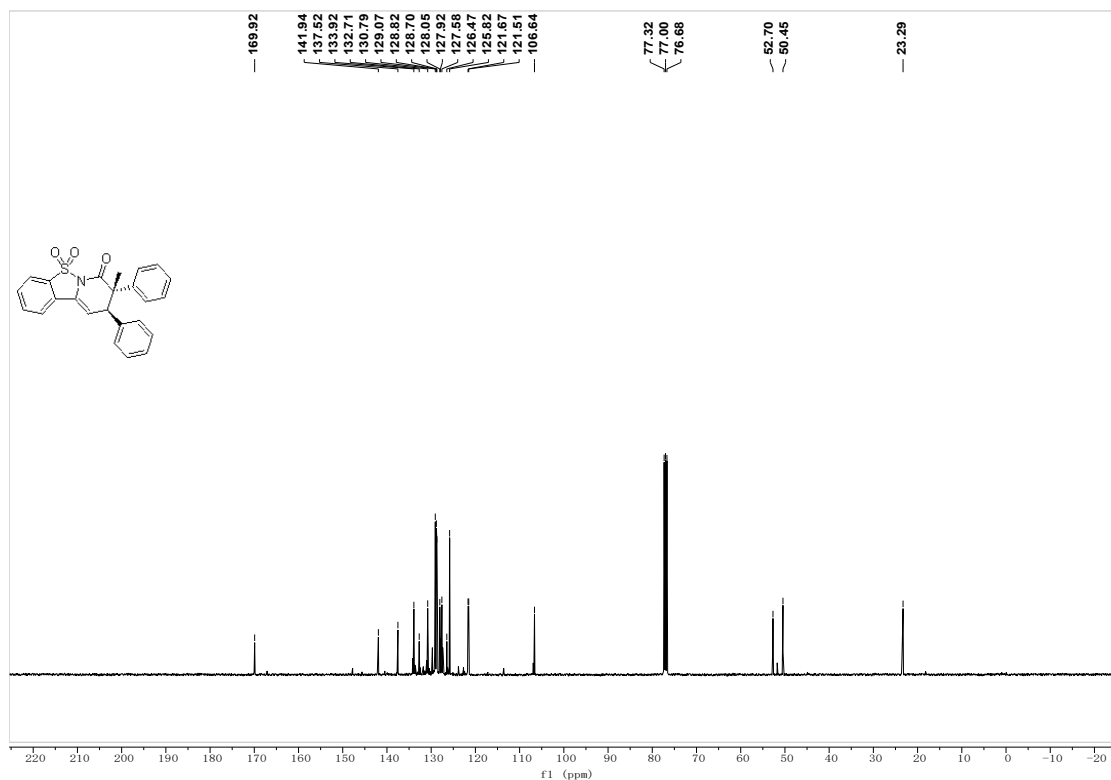
White solid (31.5 mg, 65% yield); mp 181.3 – 182.9 °C; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.89 – 7.74 (m, 4H), 7.70 – 7.57 (m, 4H), 7.52 – 7.44 (m, 2H), 7.43 – 7.36 (m, 2H), 7.34 – 7.28 (m, 2H), 7.25 – 7.20 (m, 1H), 6.20 (d, *J* = 5.9 Hz, 1H), 4.40 (d, *J* = 5.9 Hz, 1H), 1.33 (s, 3H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 169.6, 140.3, 134.6, 134.0, 133.5, 133.3, 132.9, 132.8, 131.0, 129.3, 129.1, 129.0, 128.8, 128.0, 127.9, 127.6, 127.5, 126.6, 126.4, 126.0, 121.7, 121.6, 106.2, 52.4, 50.6, 23.0. HRMS (ESI) *m/z* calcd for [M + Na]<sup>+</sup> C<sub>28</sub>H<sub>20</sub>ClNNaO<sub>3</sub>S: 508.0745; found: 508.0742; HPLC (Daicel Chiralpak IA column, *n*-hexane/*i*-PrOH = 80/20, flow rate = 1.0 mL/min, 254 nm, 25 °C, retention time: *t*<sub>major</sub> = 27.670 min, *t*<sub>minor</sub> = 61.177 min, 84% ee; >20:1 dr).

## 5. NMR Spectra

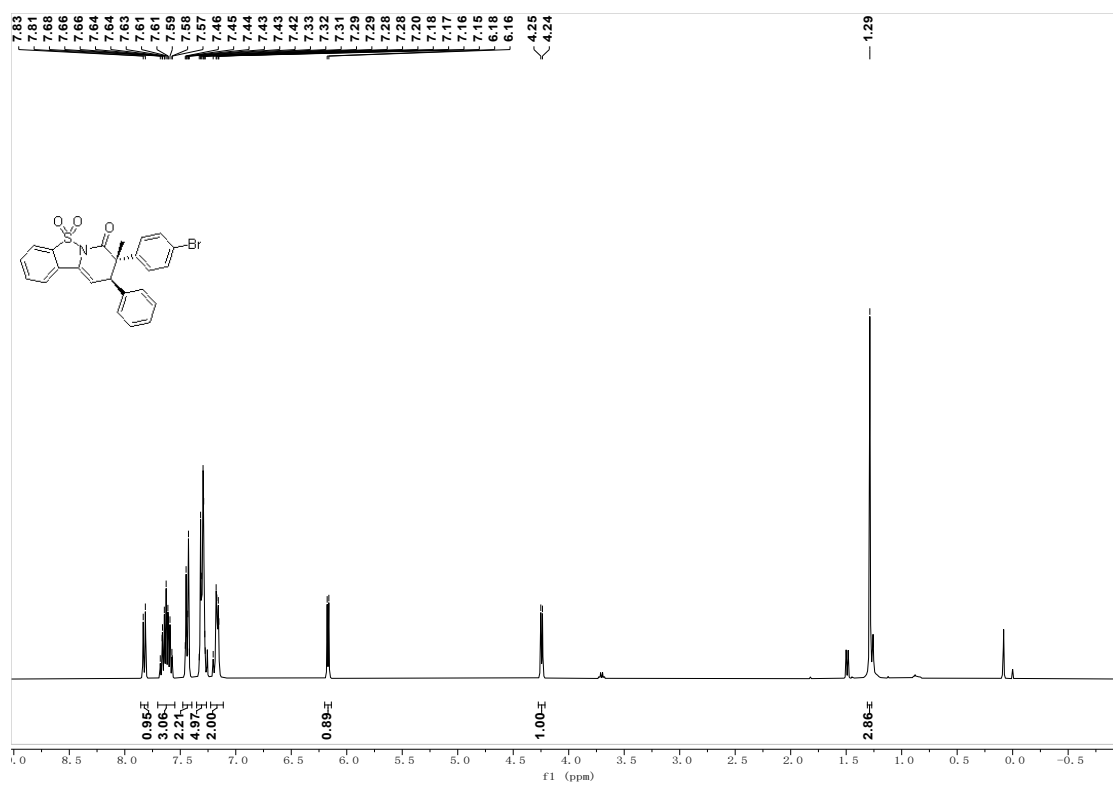
$^1\text{H}$  NMR spectrum of compound (**3a**)



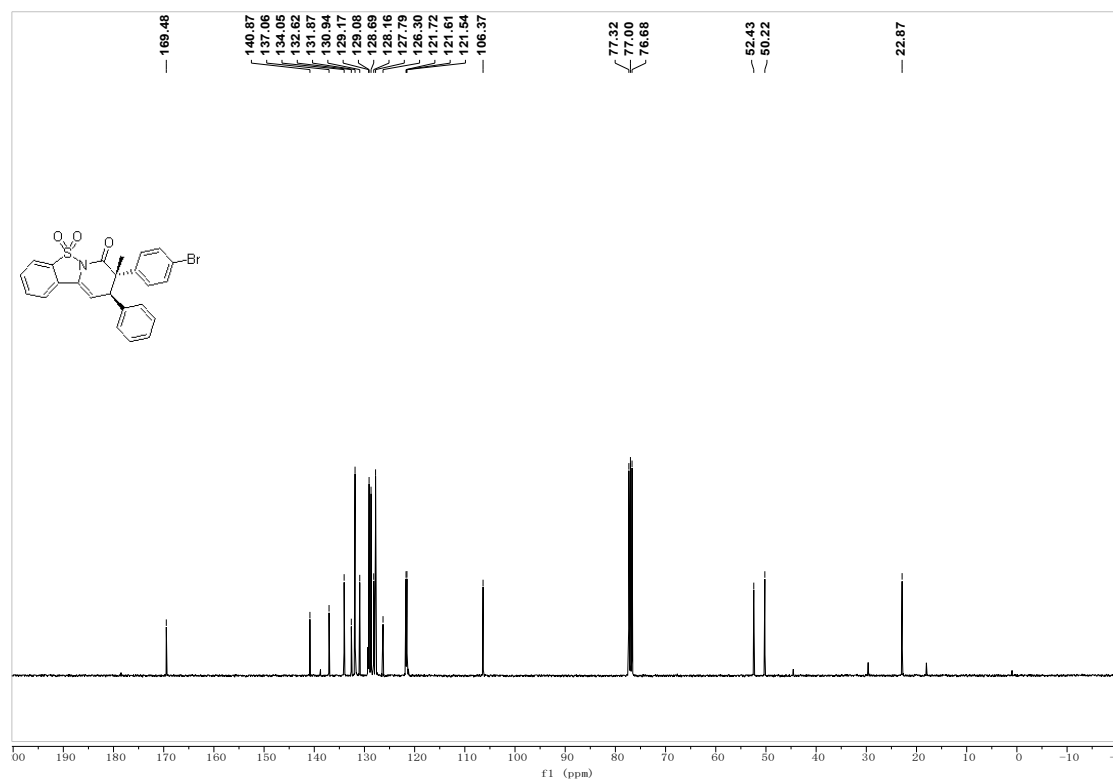
$^{13}\text{C}$  NMR spectrum of compound (**3a**)



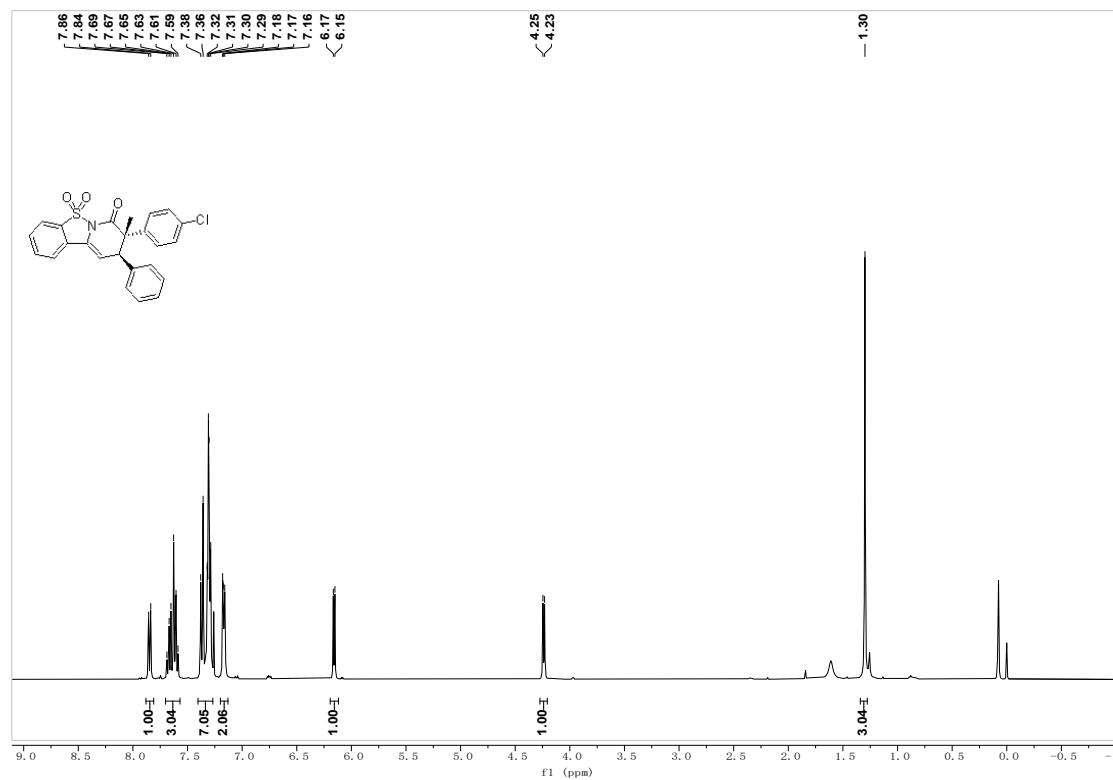
<sup>1</sup>H NMR spectrum of compound (3b)



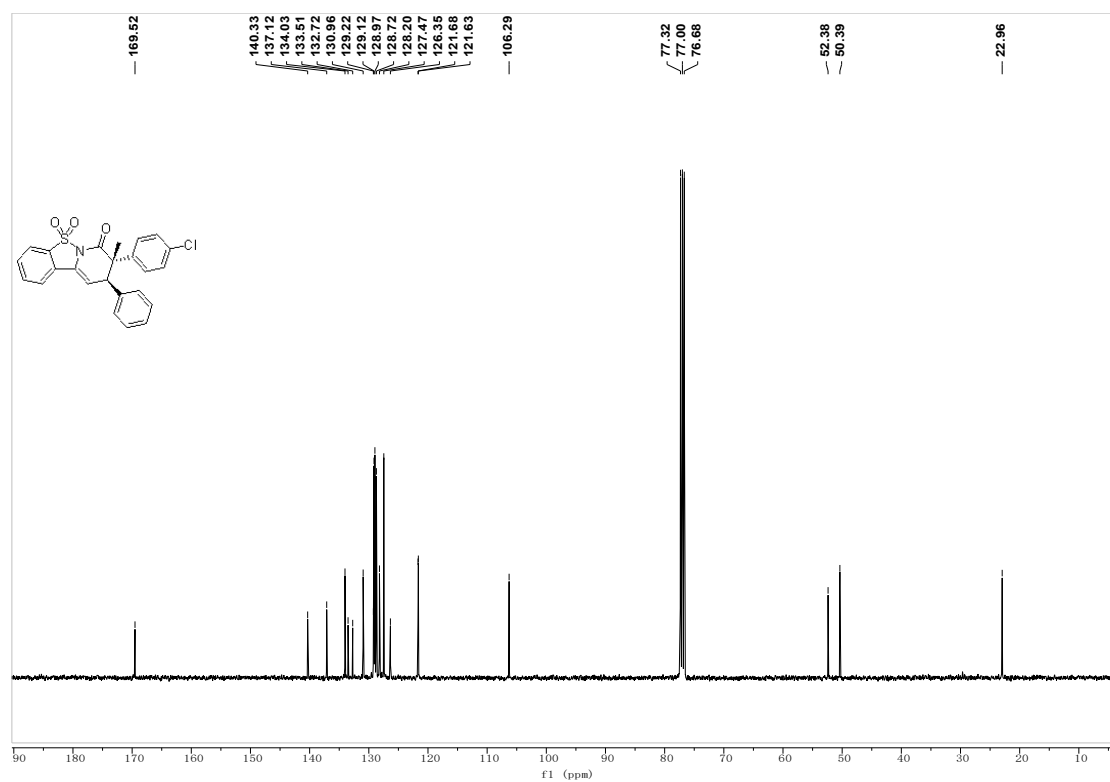
<sup>13</sup>C NMR spectrum of compound (3b)



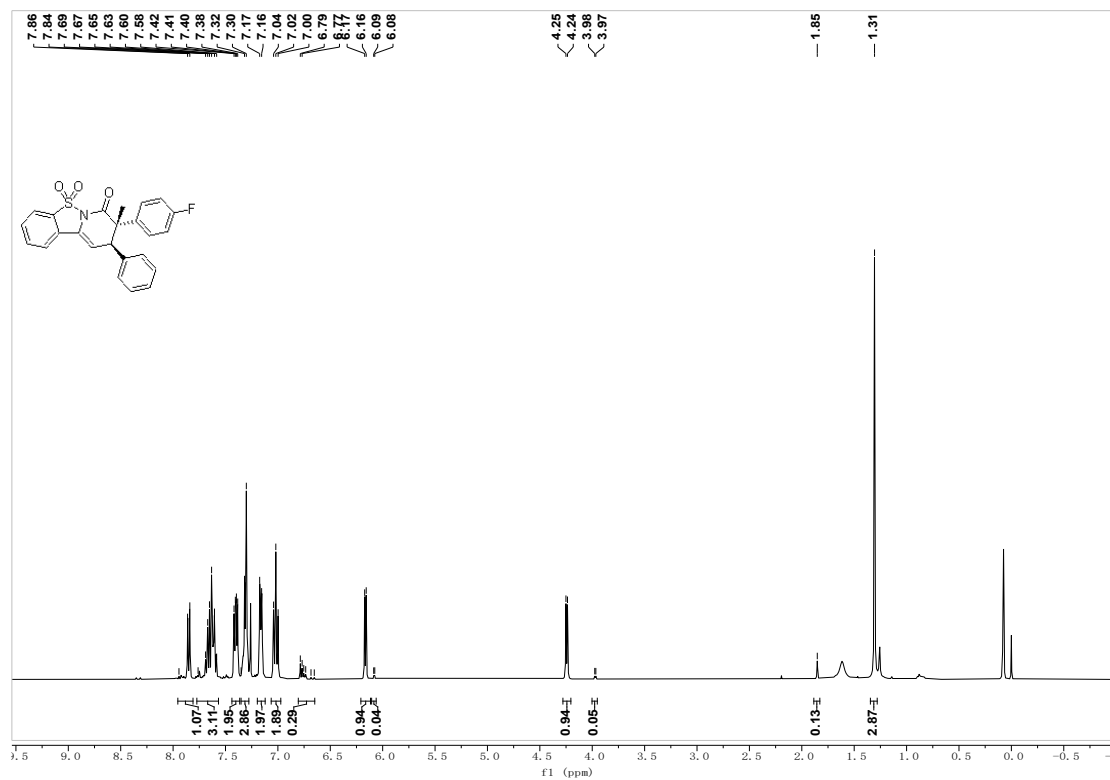
<sup>1</sup>H NMR spectrum of compound (3c)



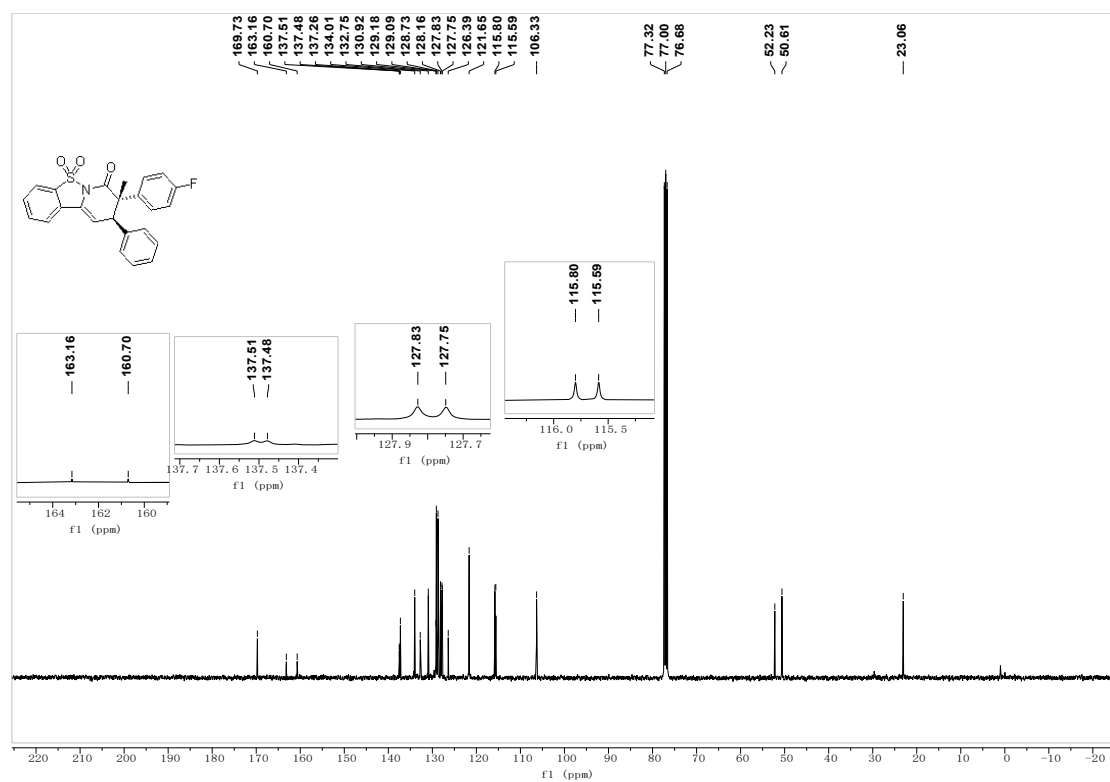
<sup>13</sup>C NMR spectrum of compound (3c)



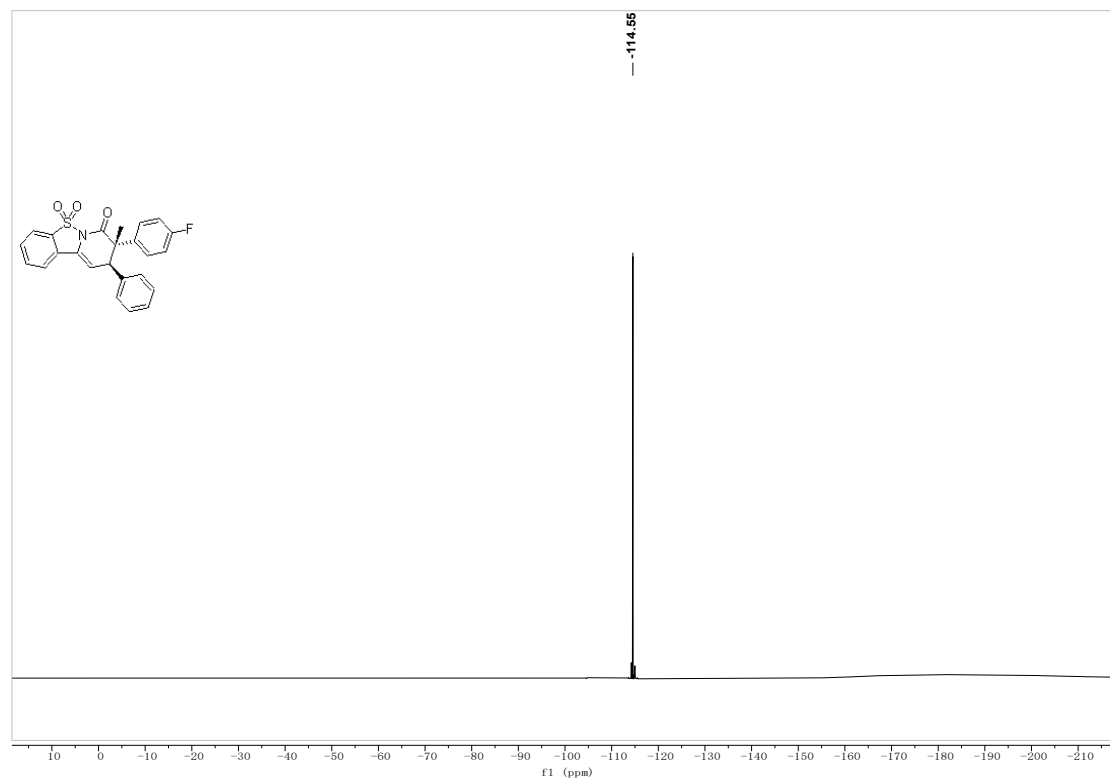
<sup>1</sup>H NMR spectrum of compound (3d)



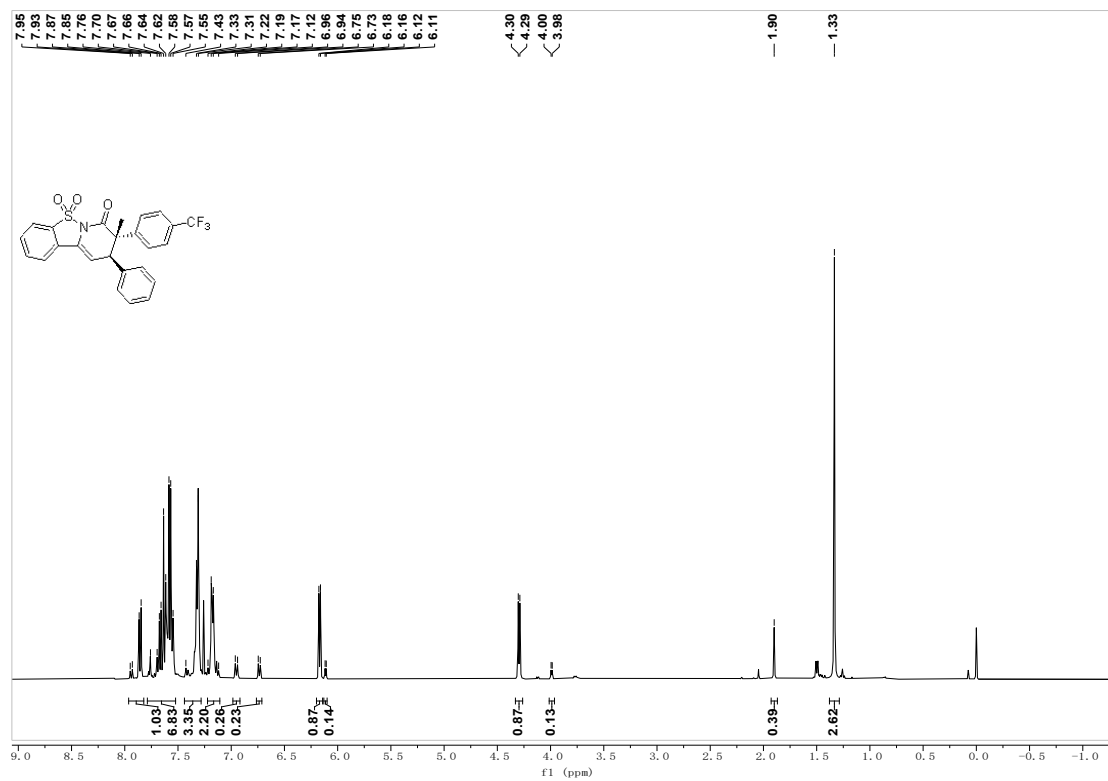
<sup>13</sup>C NMR spectrum of compound (3d)



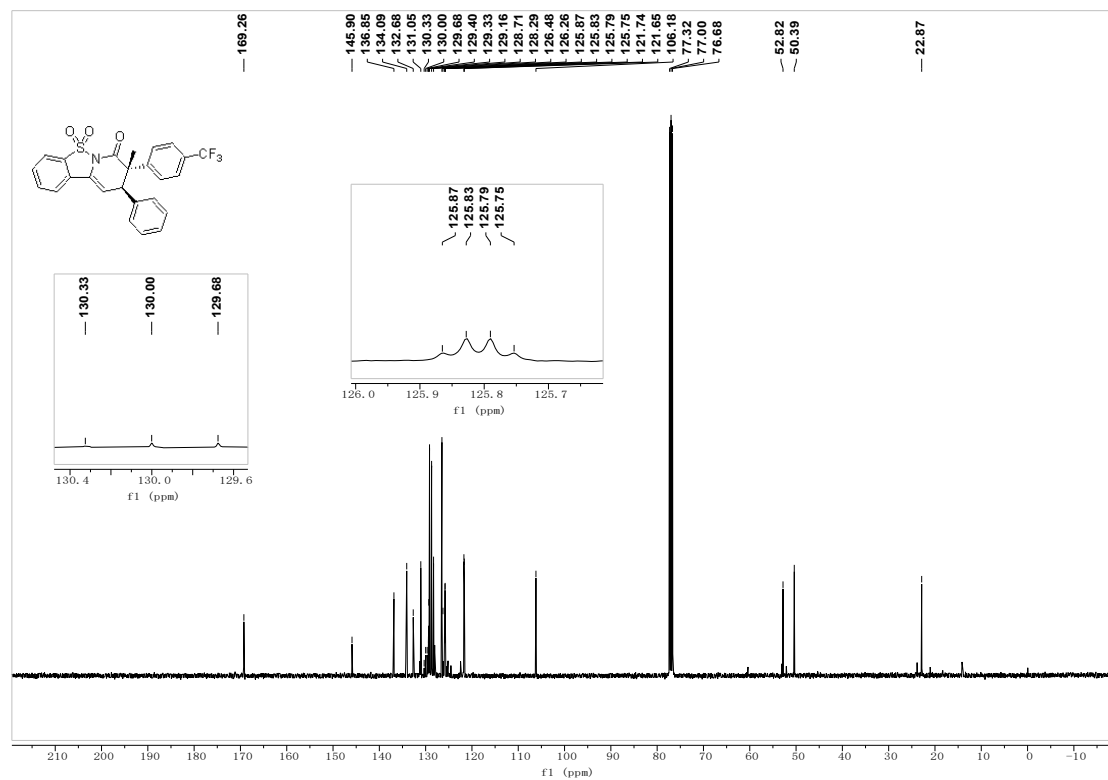
<sup>19</sup>F NMR spectrum of compound (3d)



<sup>1</sup>H NMR spectrum of compound (3e)

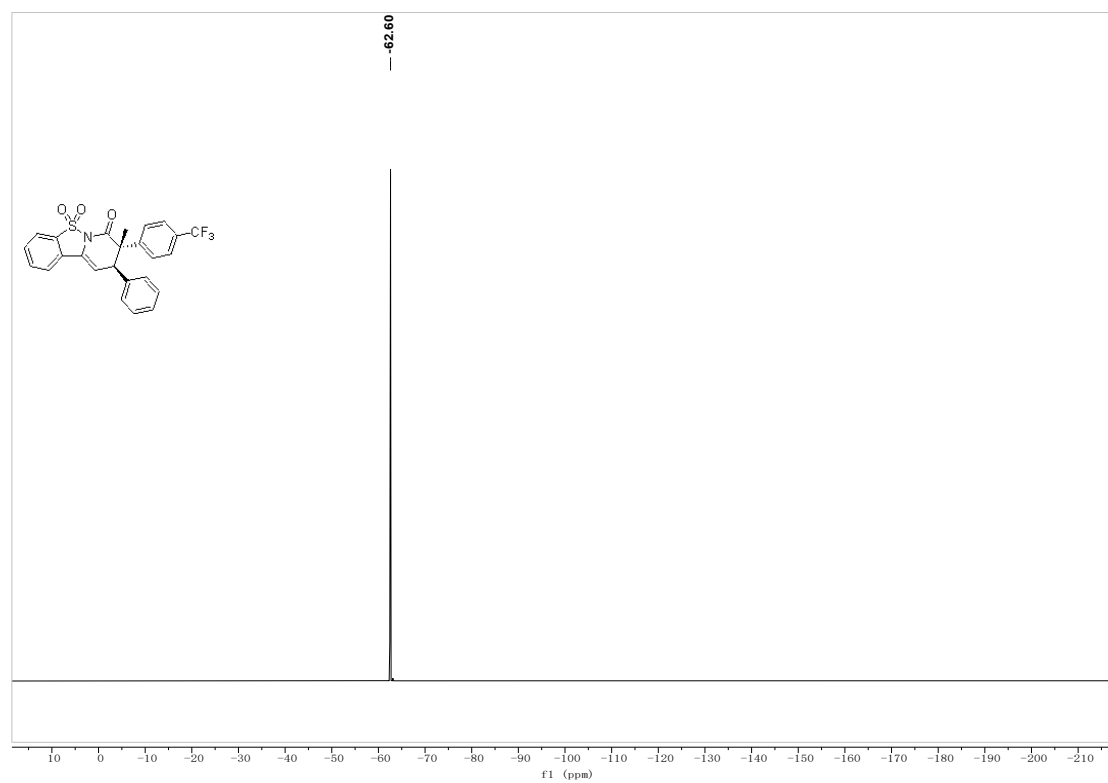


<sup>13</sup>C NMR spectrum of compound (3e)

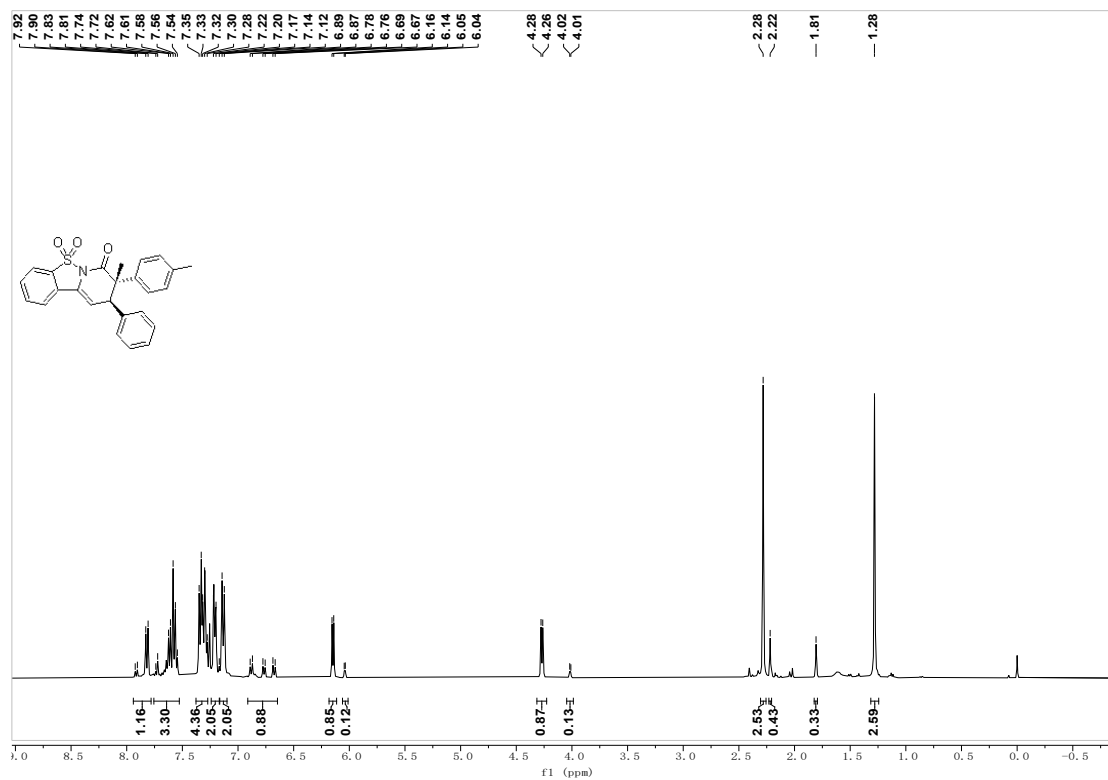




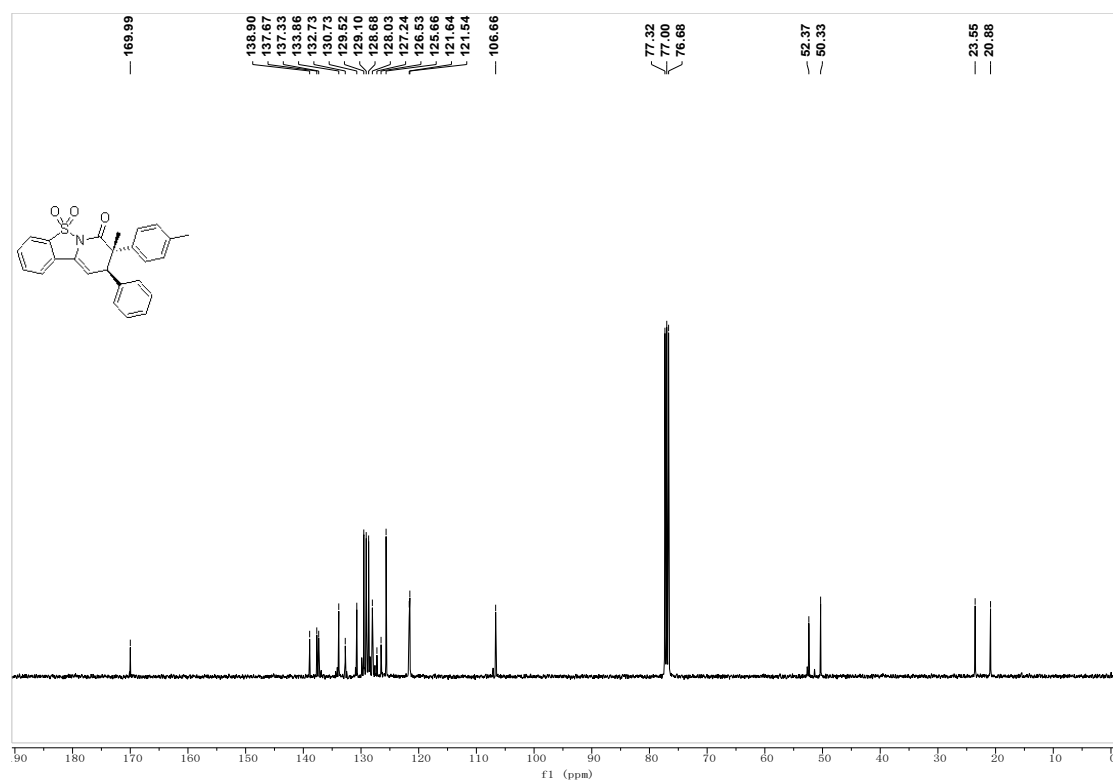
$^{19}\text{F}$  NMR spectrum of compound (3e)



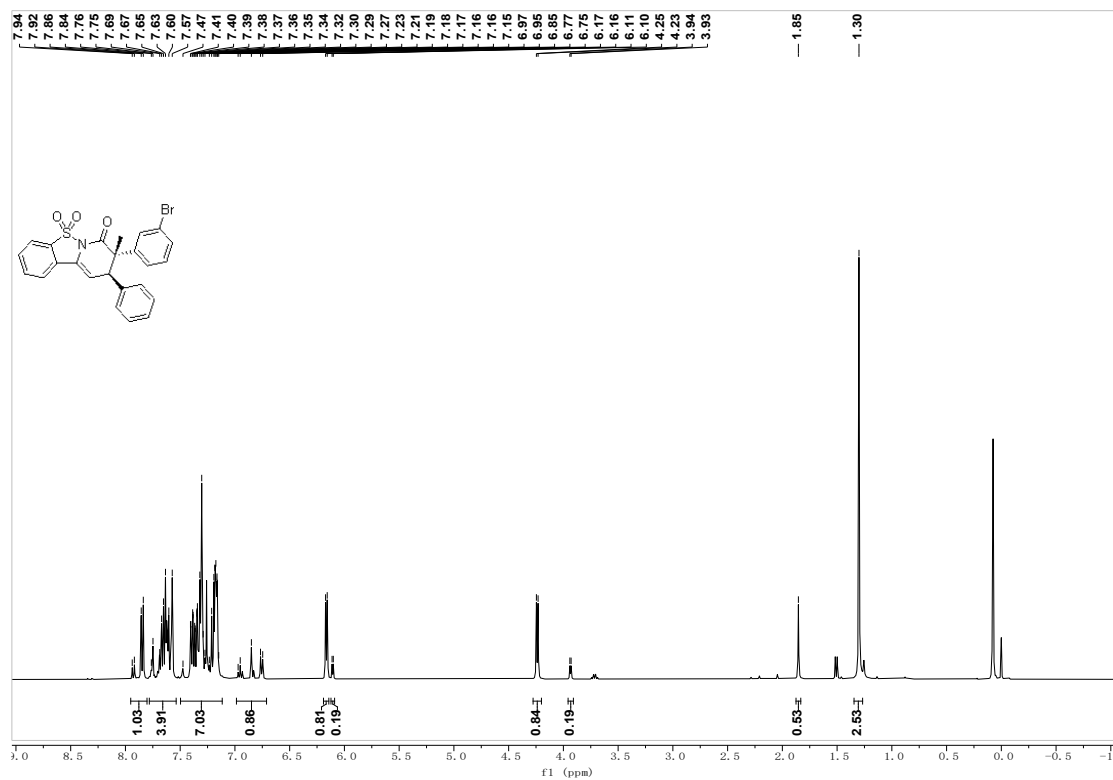
$^1\text{H}$  NMR spectrum of compound (3f)



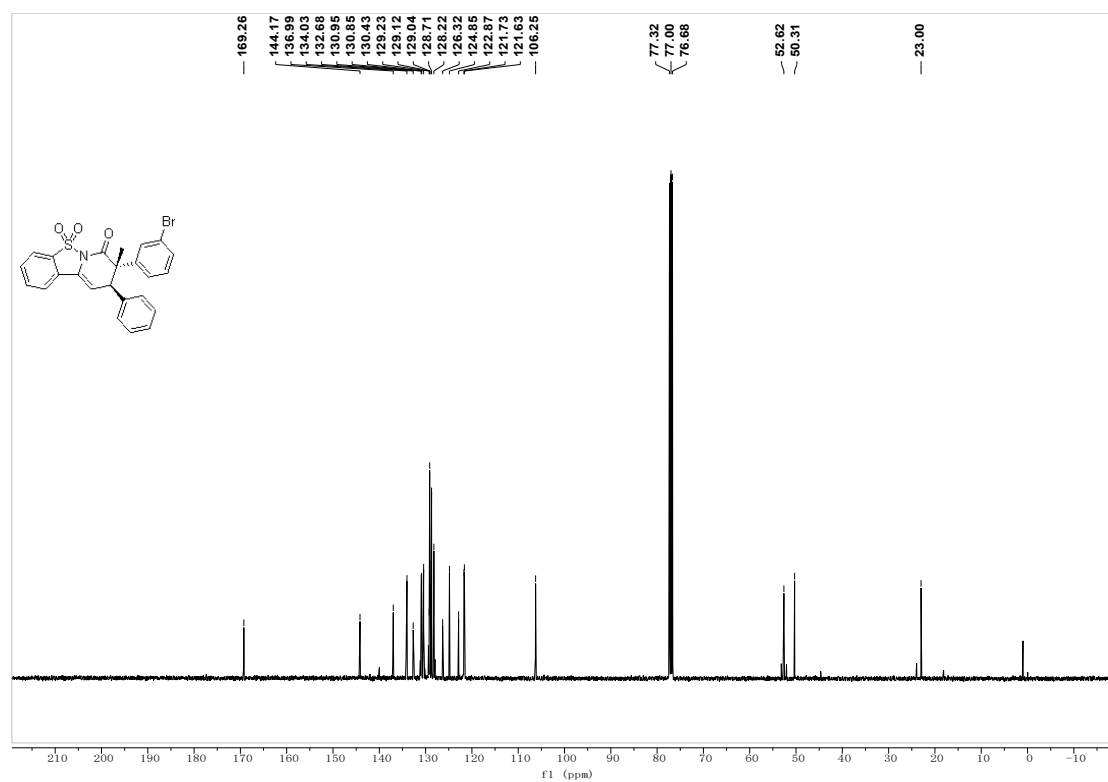
<sup>13</sup>C NMR spectrum of compound (**3f**)



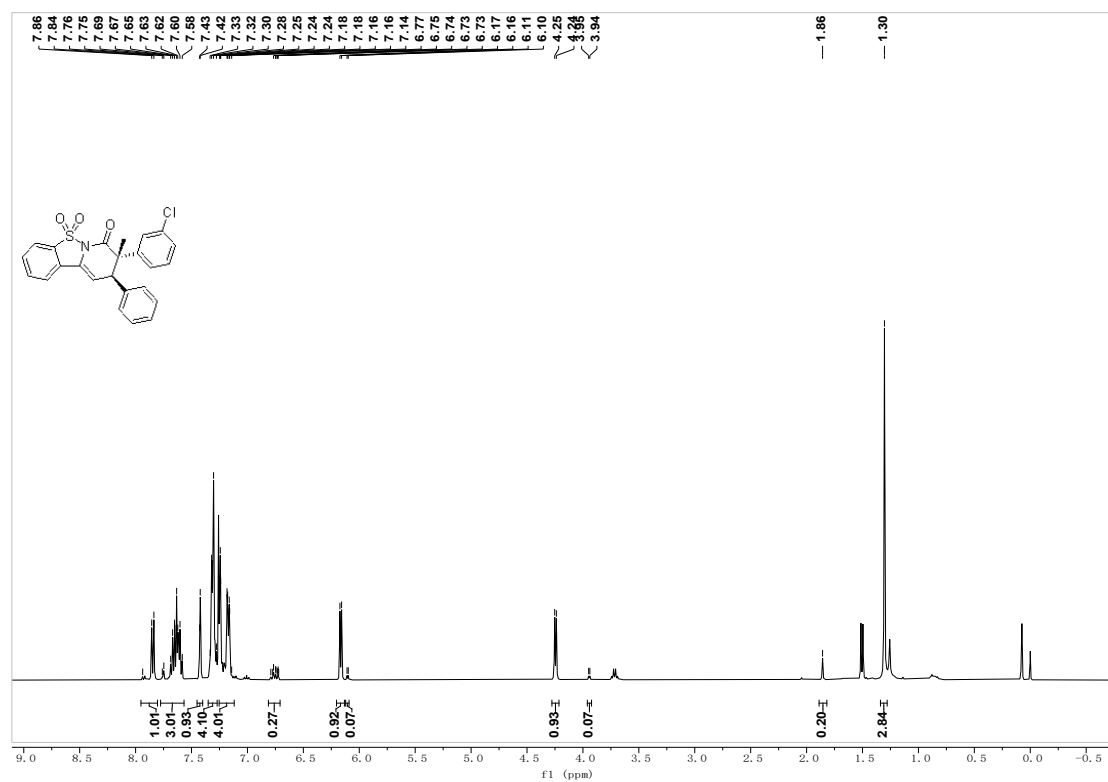
<sup>1</sup>H NMR spectrum of compound (**3g**)



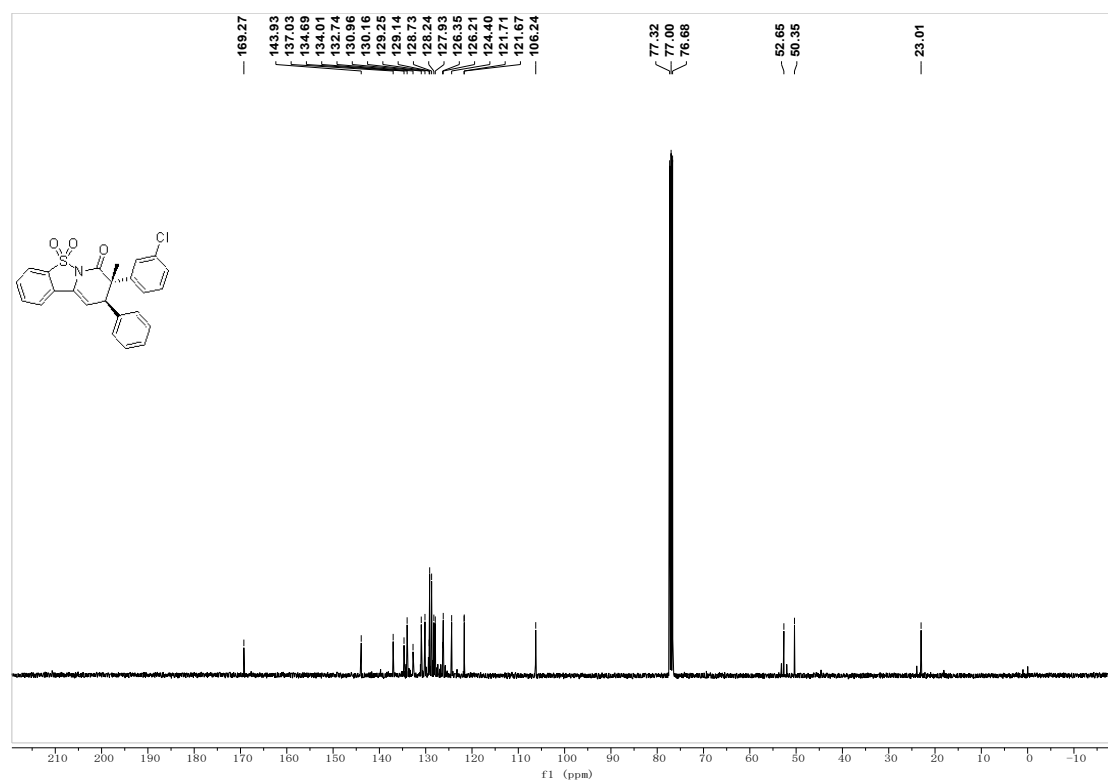
$^{13}\text{C}$  NMR spectrum of compound (**3g**)



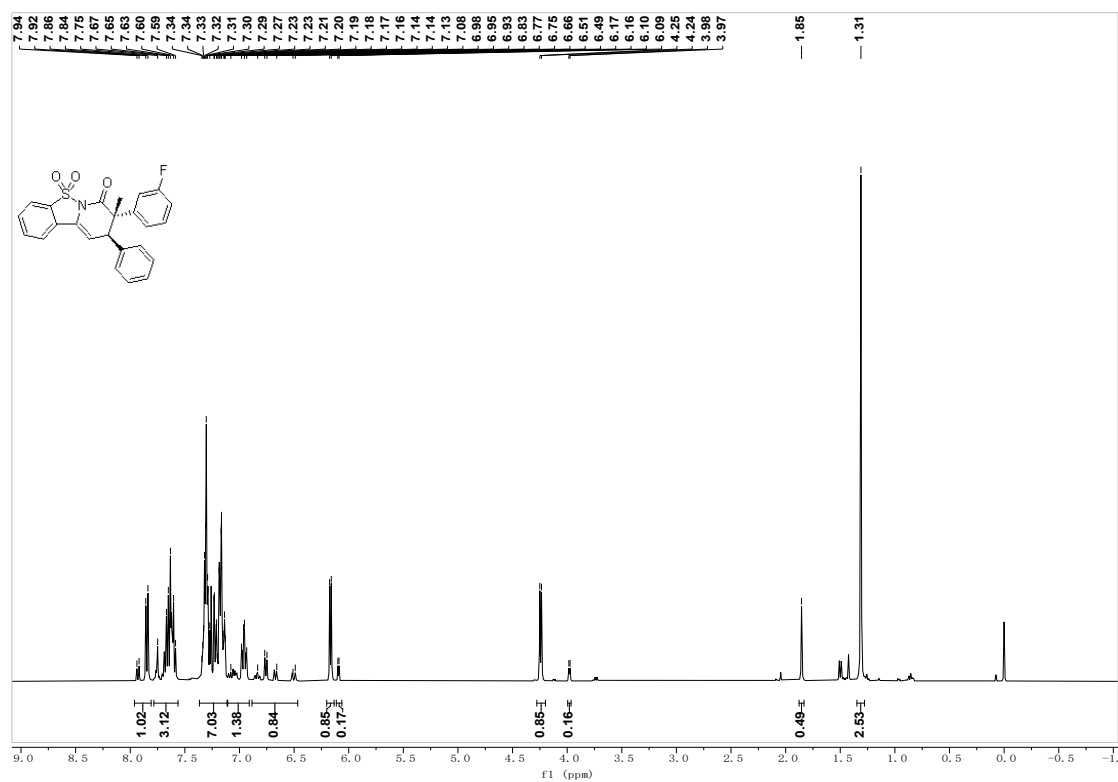
$^1\text{H}$  NMR spectrum of compound (**3h**)



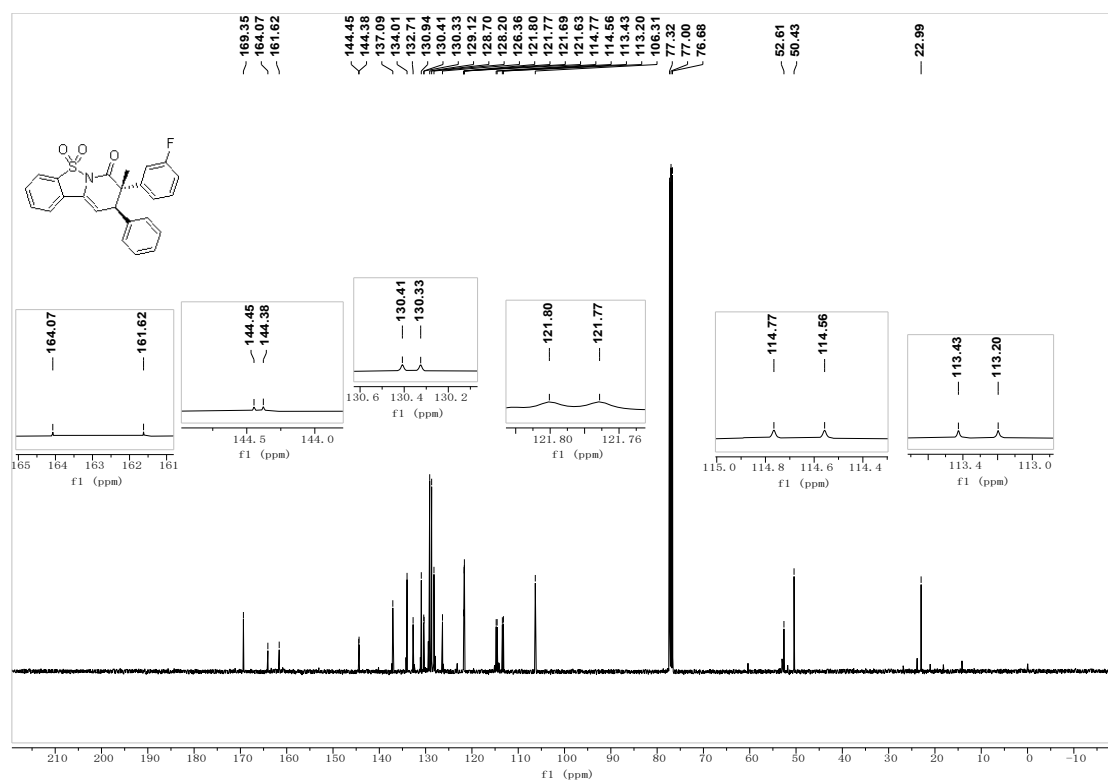
$^{13}\text{C}$  NMR spectrum of compound (**3h**)



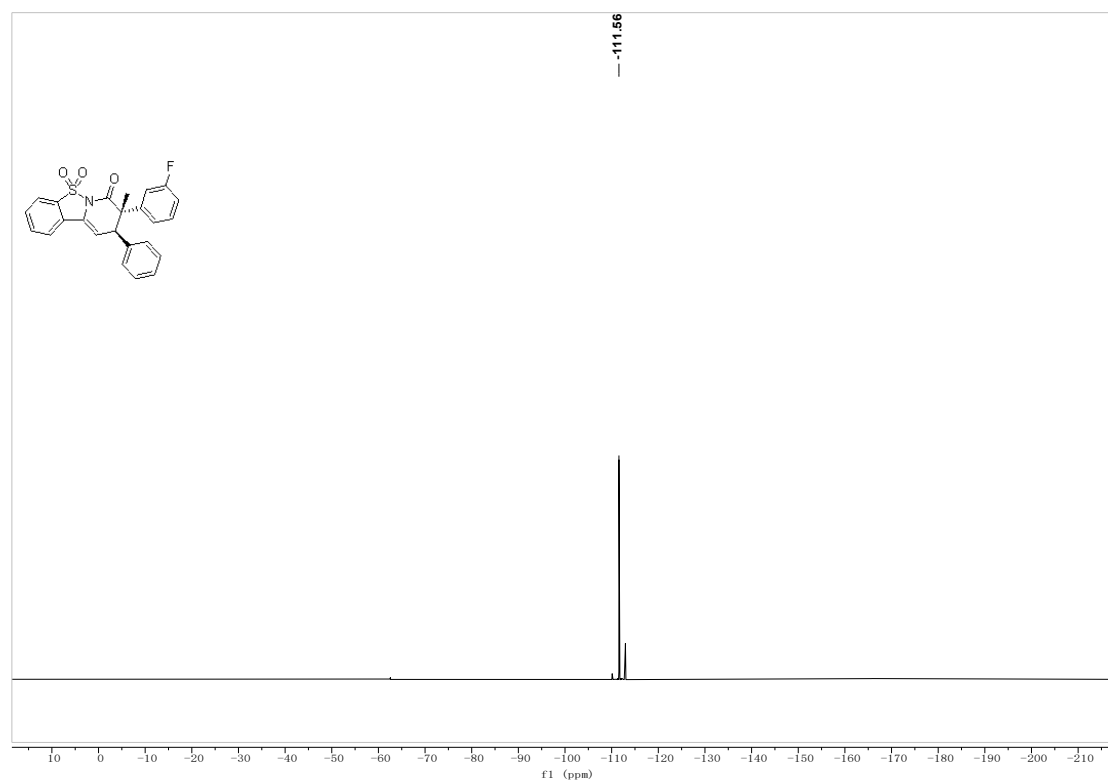
$^1\text{H}$  NMR spectrum of compound (**3i**)



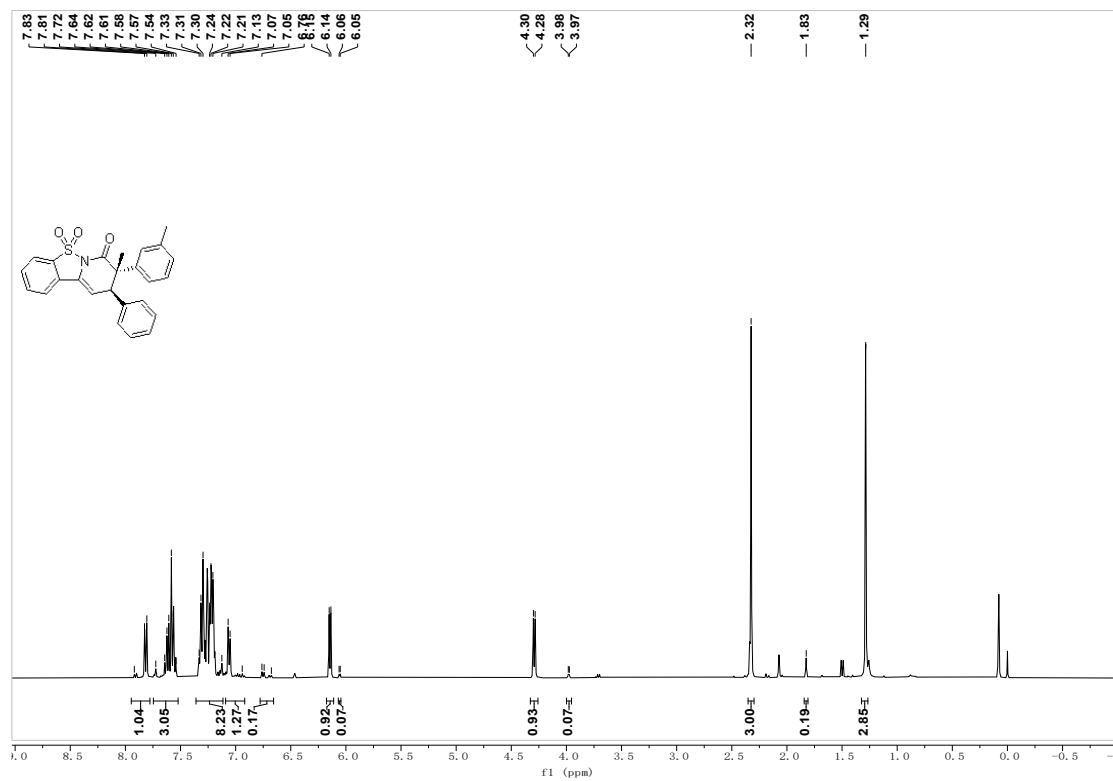
<sup>13</sup>C NMR spectrum of compound (3i)



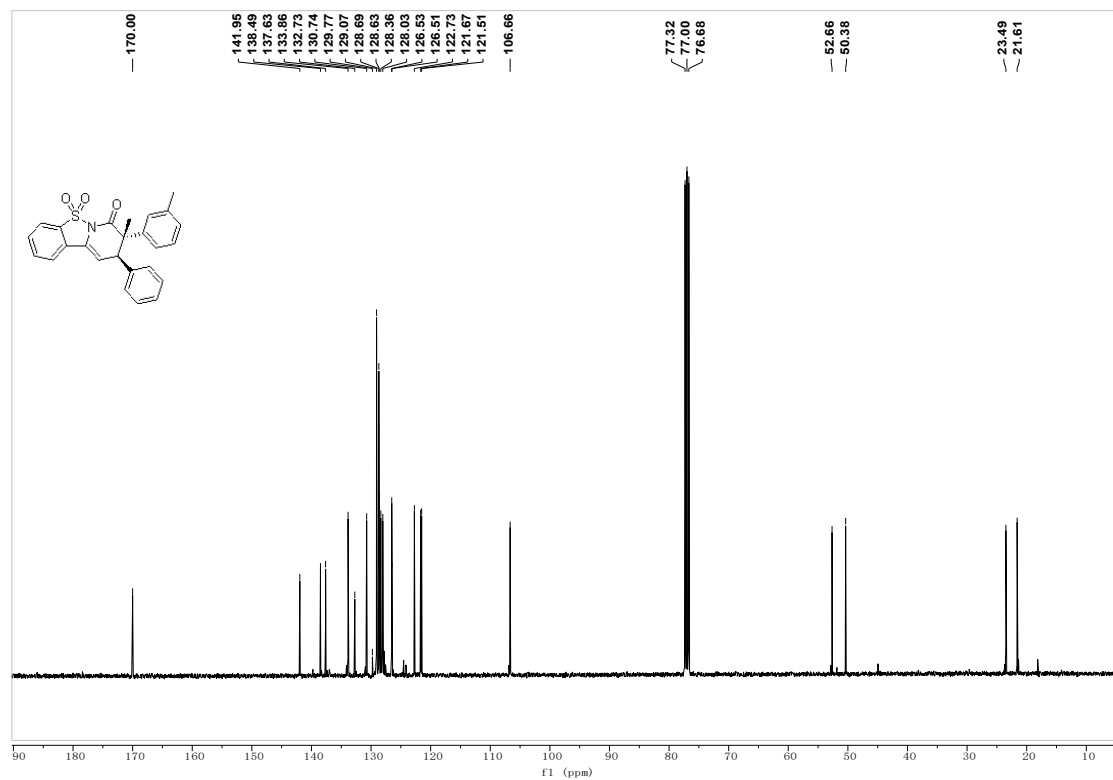
<sup>19</sup>F NMR spectrum of compound (3i)



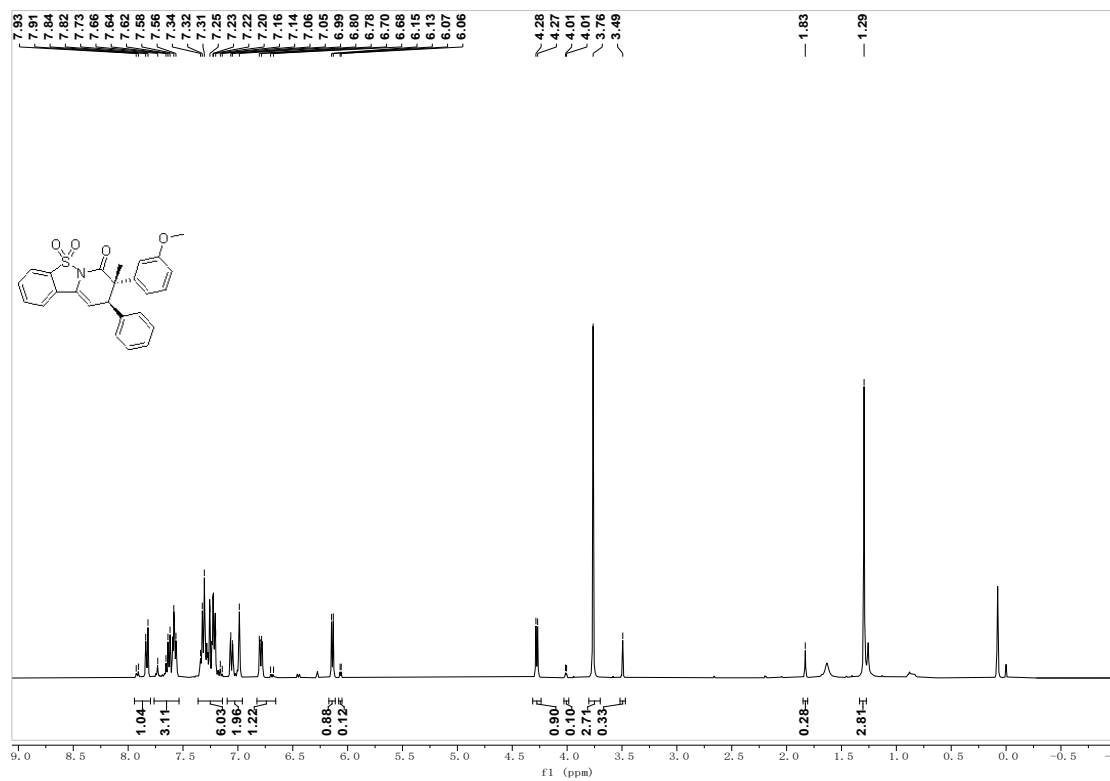
<sup>1</sup>H NMR spectrum of compound (3j)



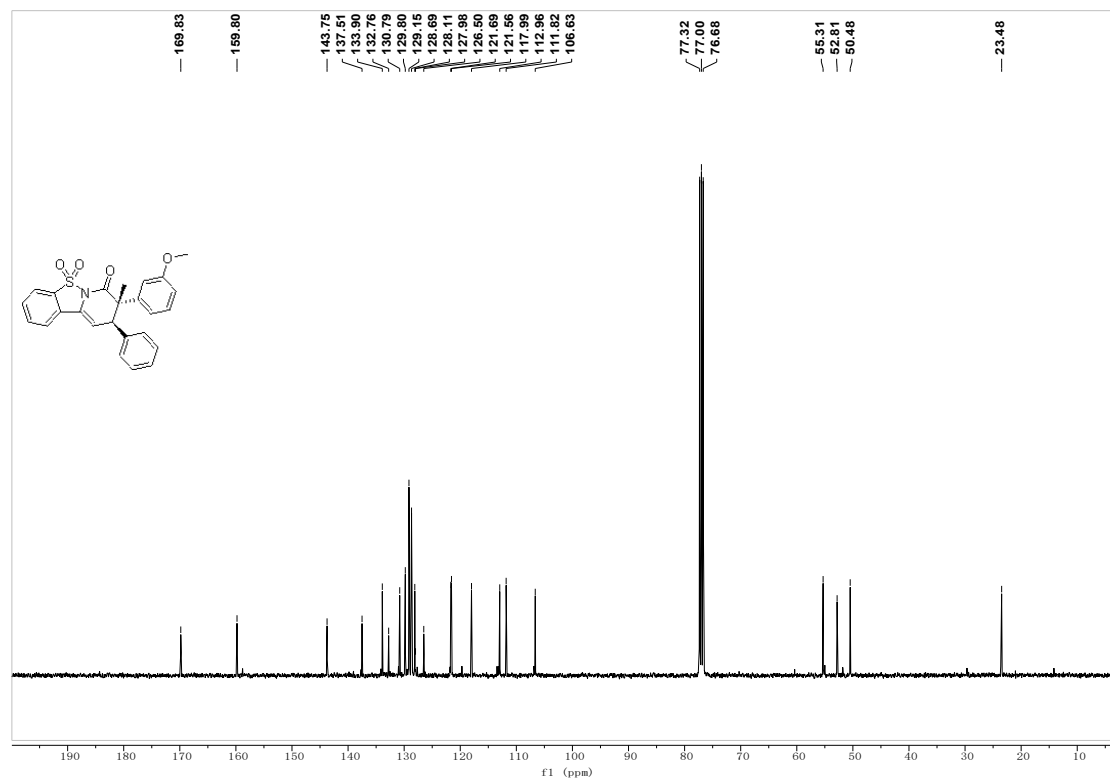
<sup>13</sup>C NMR spectrum of compound (3j)



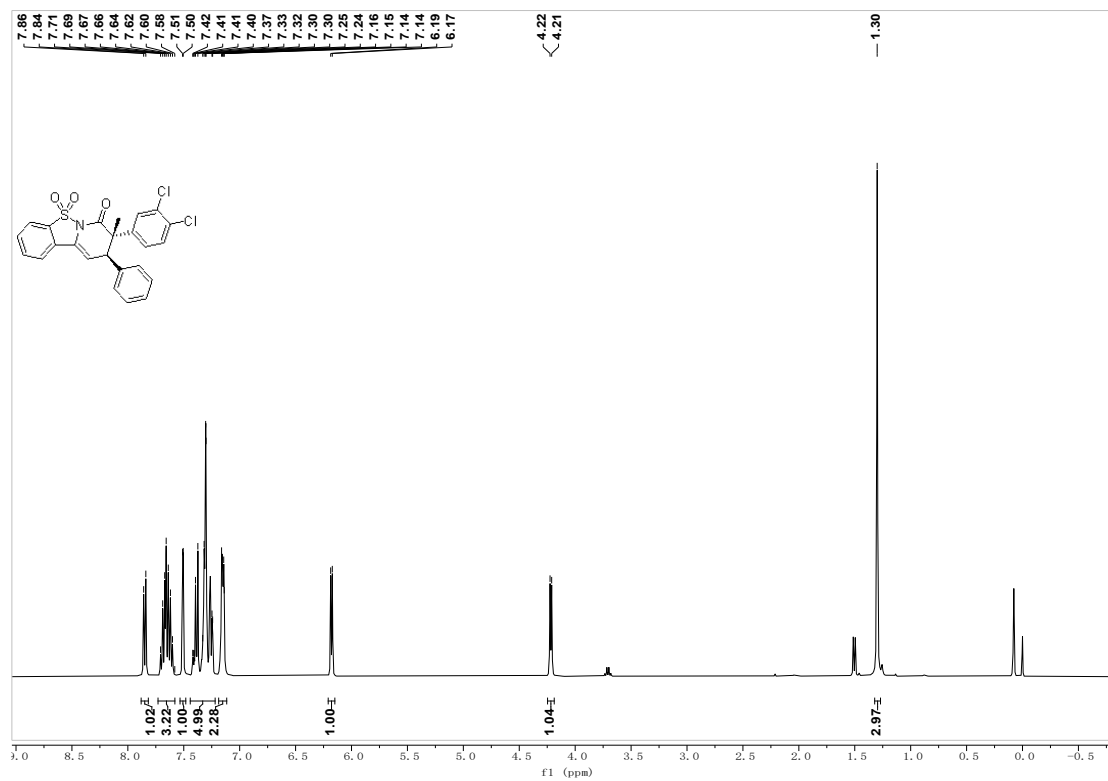
<sup>1</sup>H NMR spectrum of compound (3k)



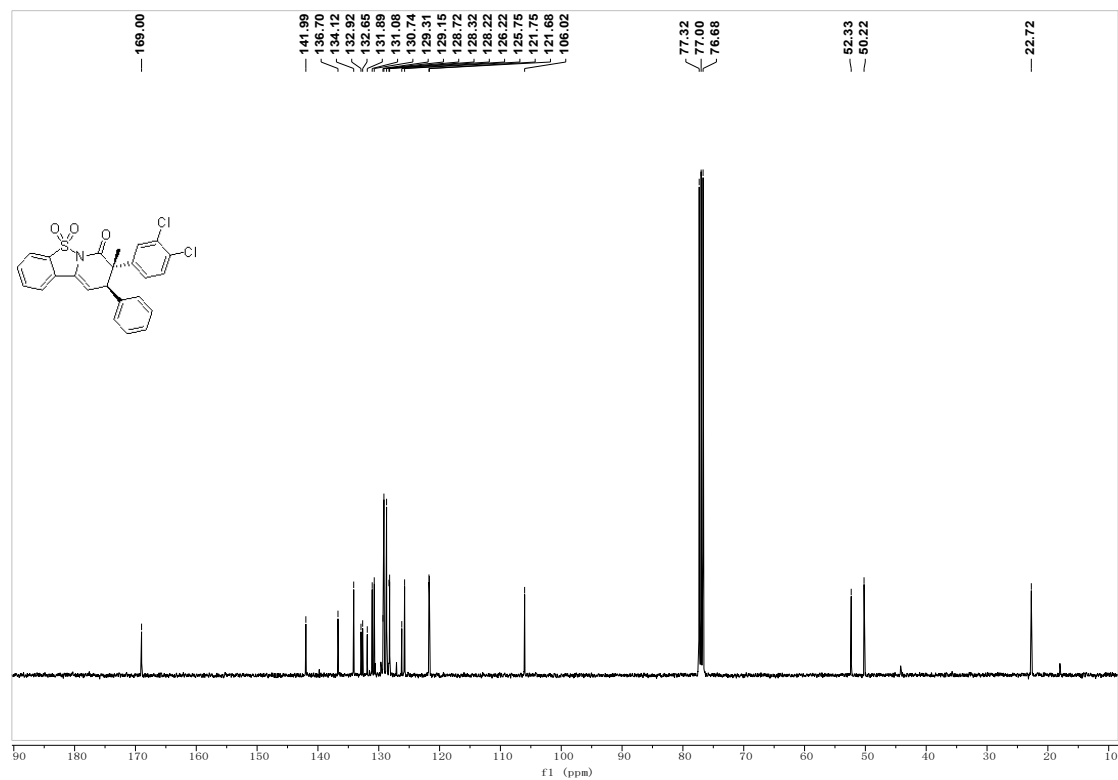
<sup>13</sup>C NMR spectrum of compound (3k)



<sup>1</sup>H NMR spectrum of compound (31)

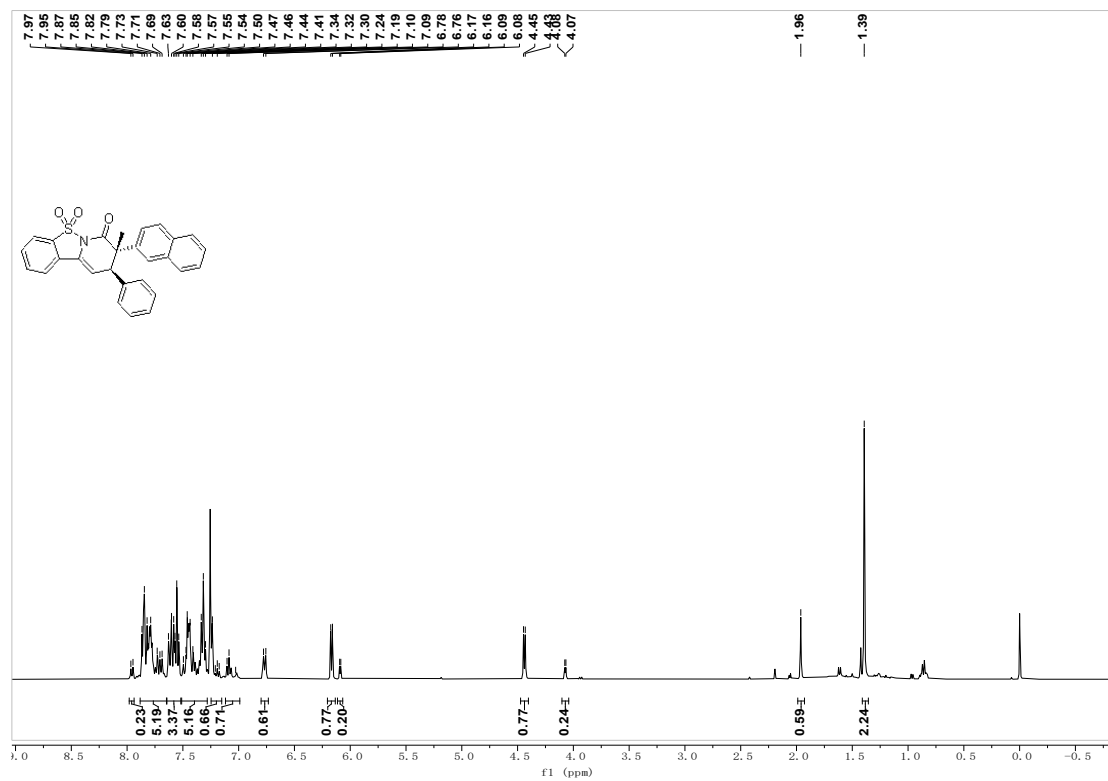


<sup>13</sup>C NMR spectrum of compound (31)

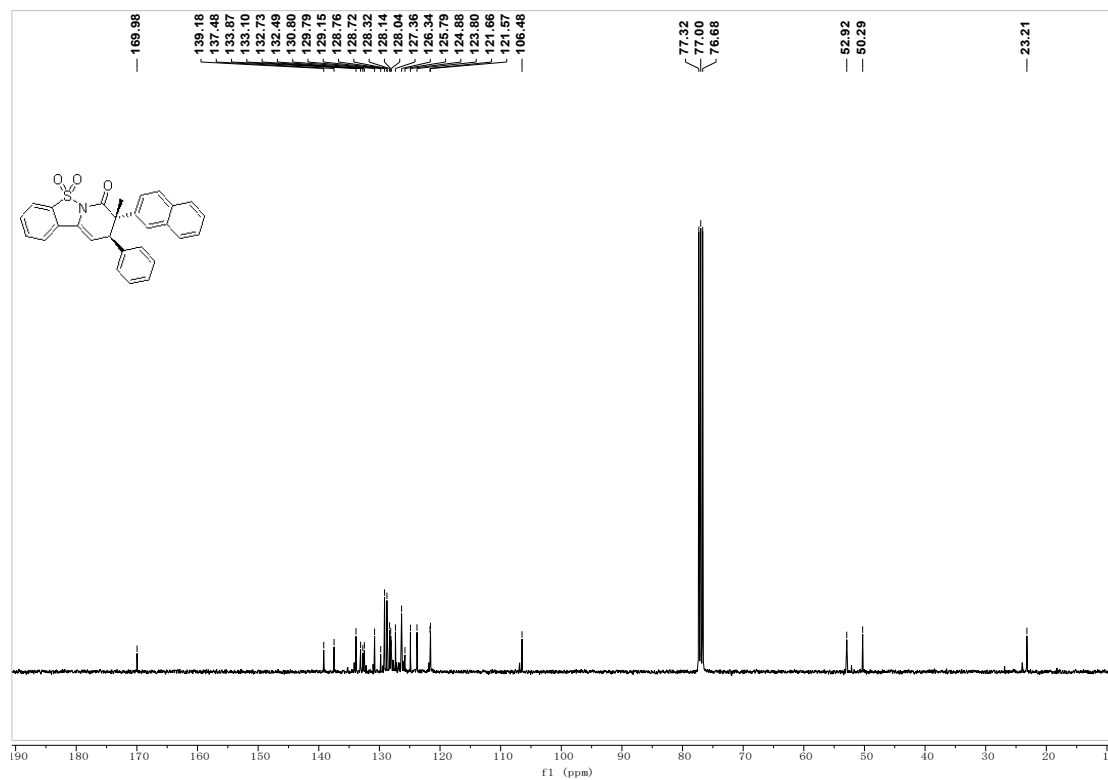




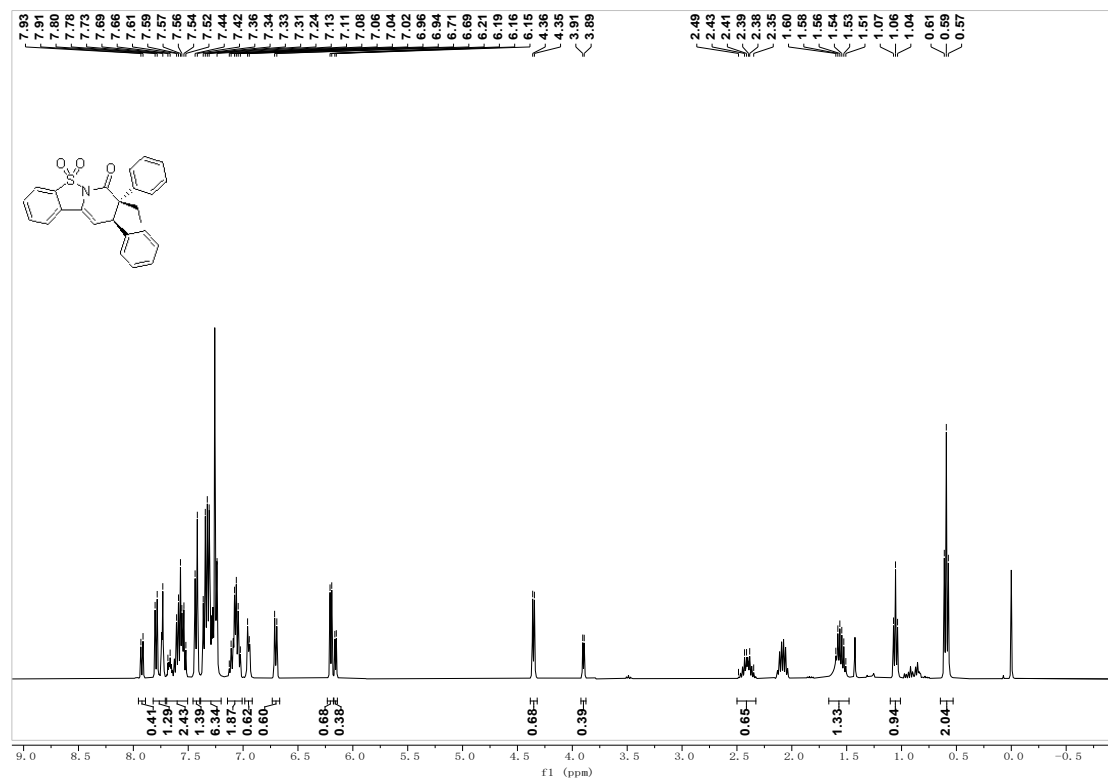
<sup>1</sup>H NMR spectrum of compound (3m)



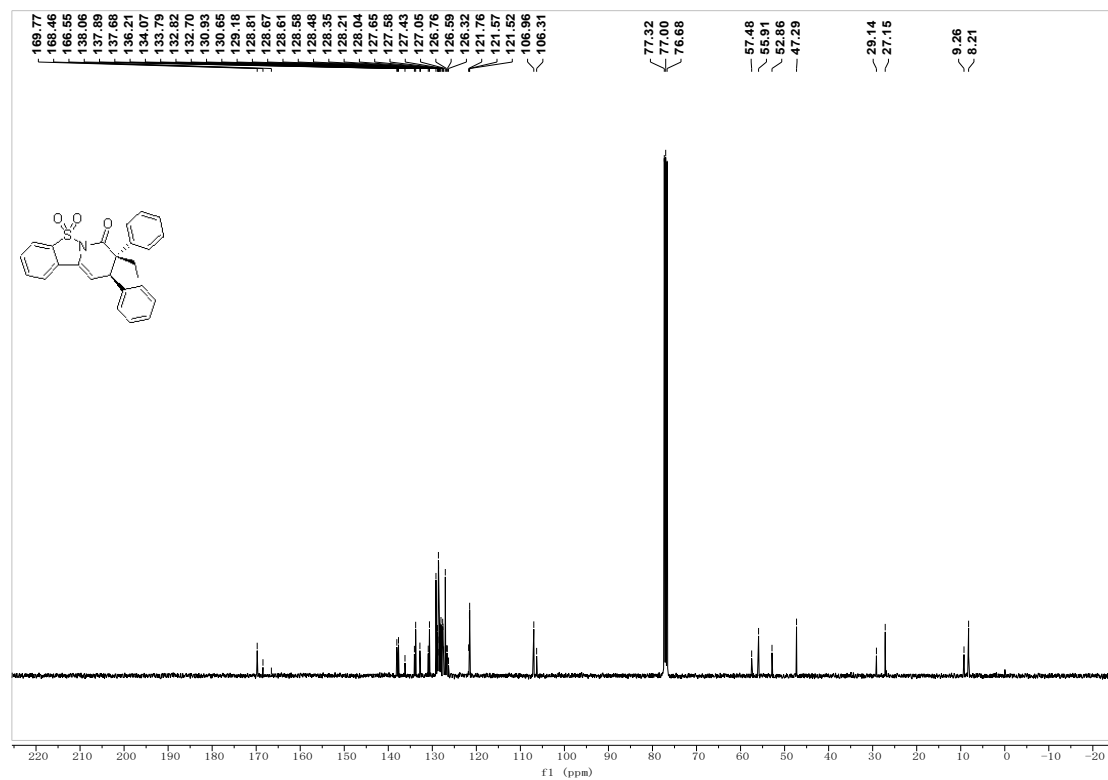
<sup>13</sup>C NMR spectrum of compound (3m)



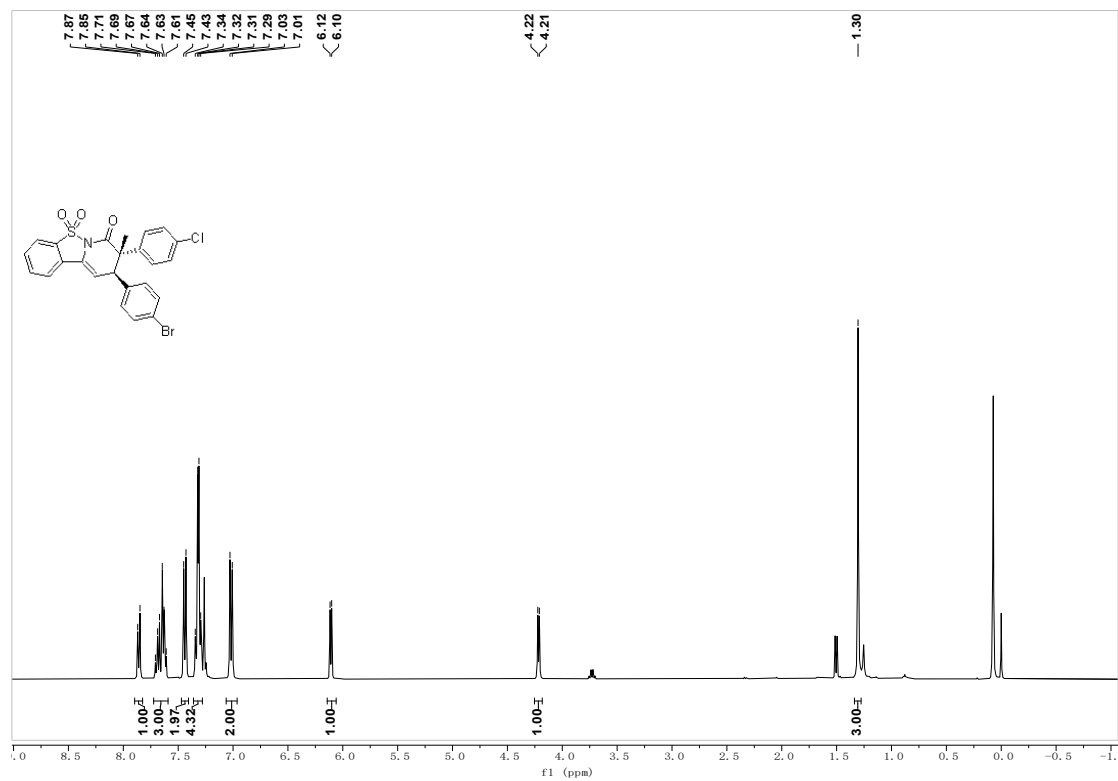
<sup>1</sup>H NMR spectrum of compound (3n)



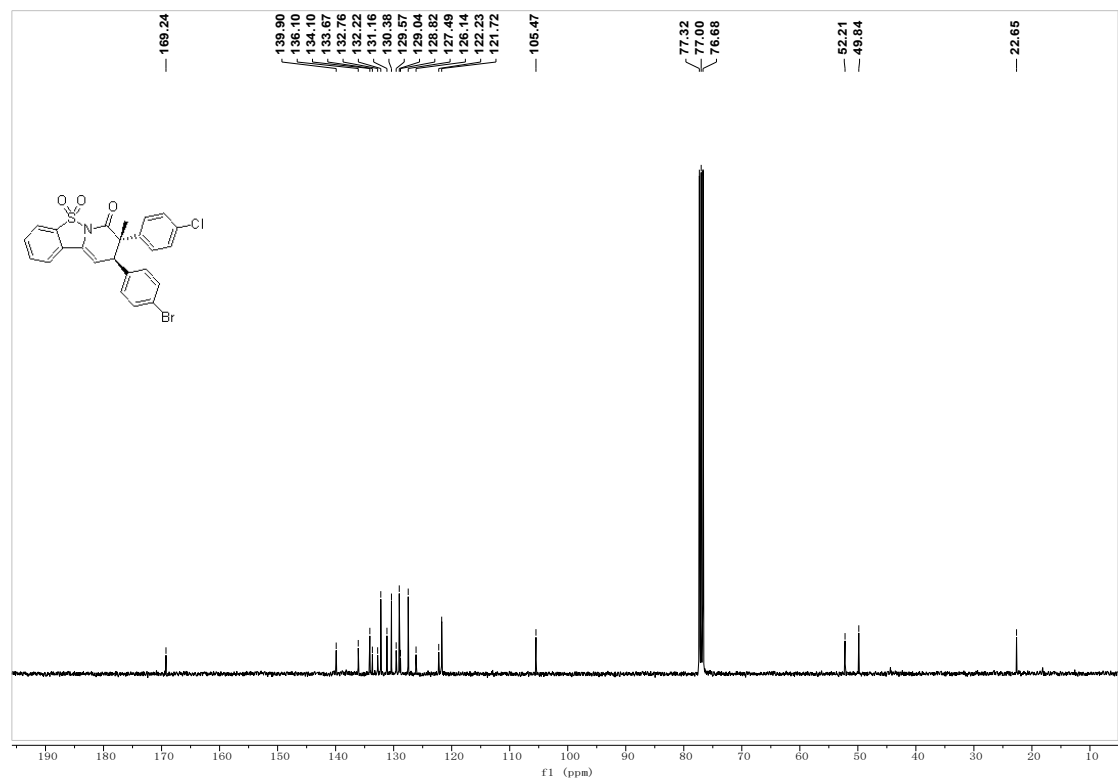
<sup>13</sup>C NMR spectrum of compound (3n)



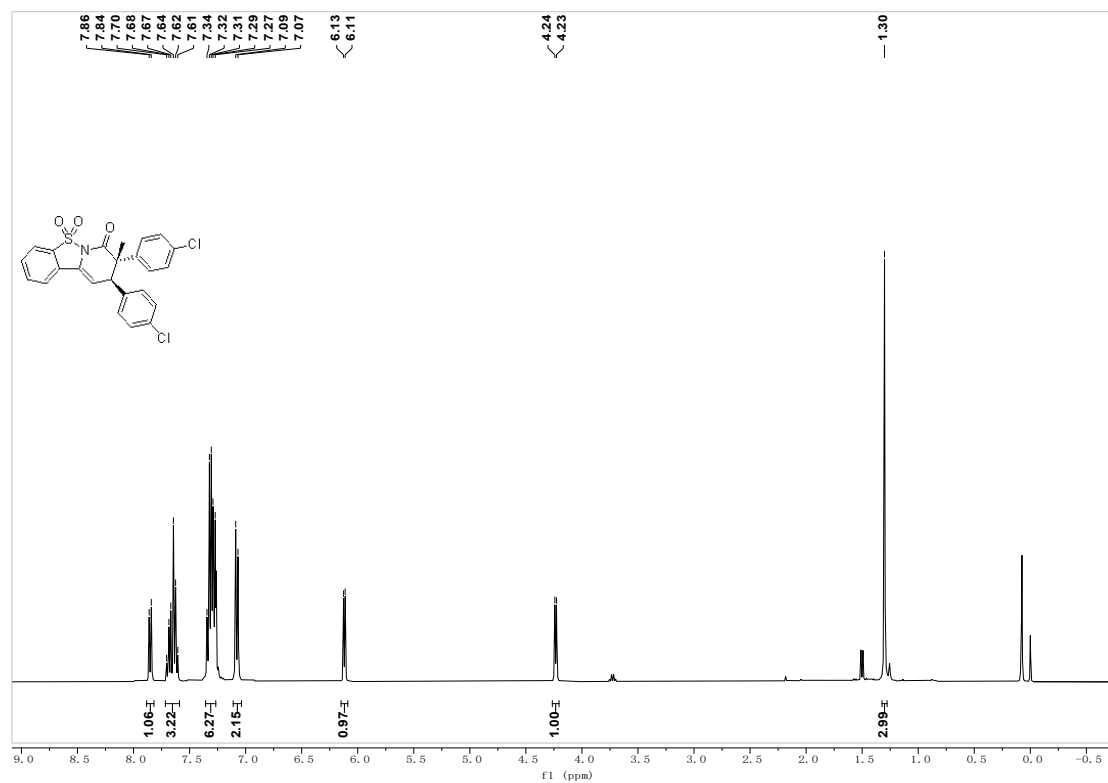
<sup>1</sup>H NMR spectrum of compound (30)



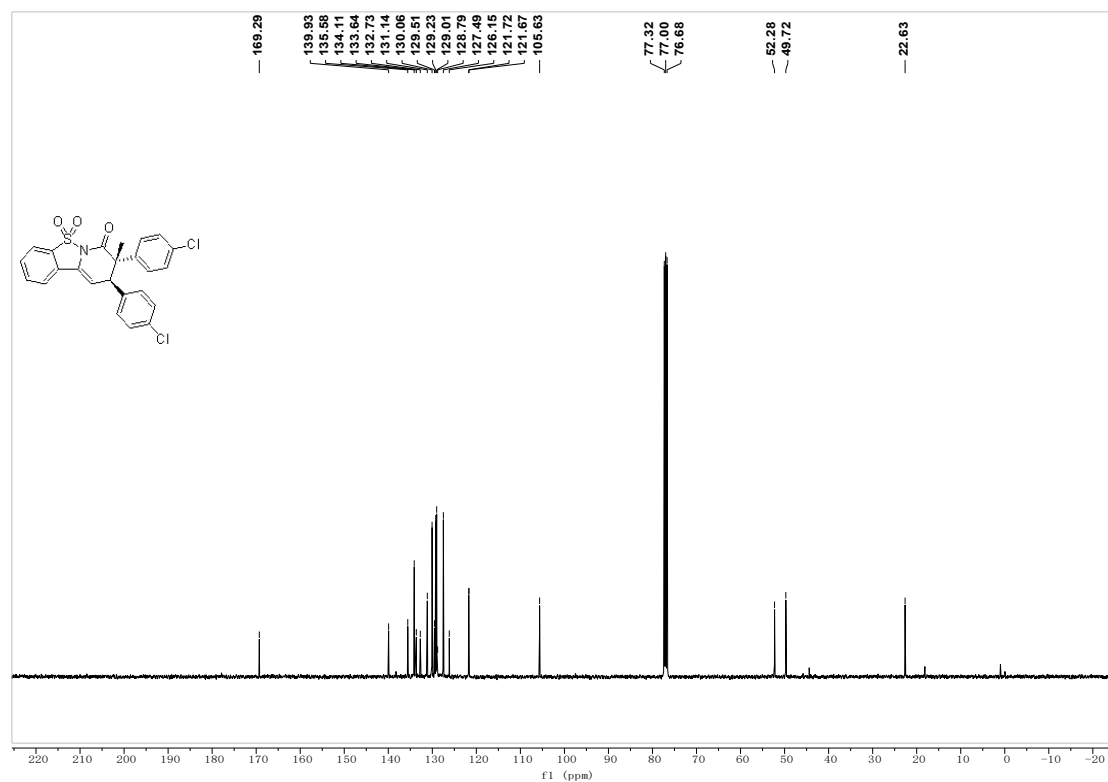
<sup>13</sup>C NMR spectrum of compound (30)



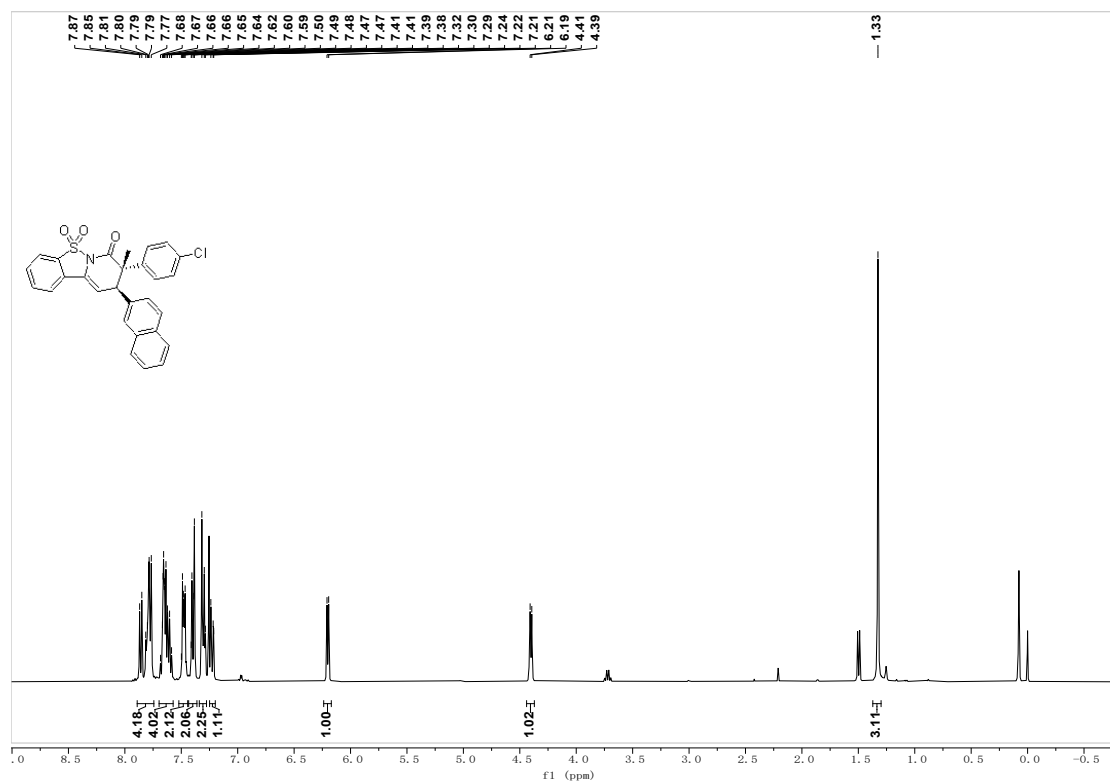
$^1\text{H}$  NMR spectrum of compound (**3p**)



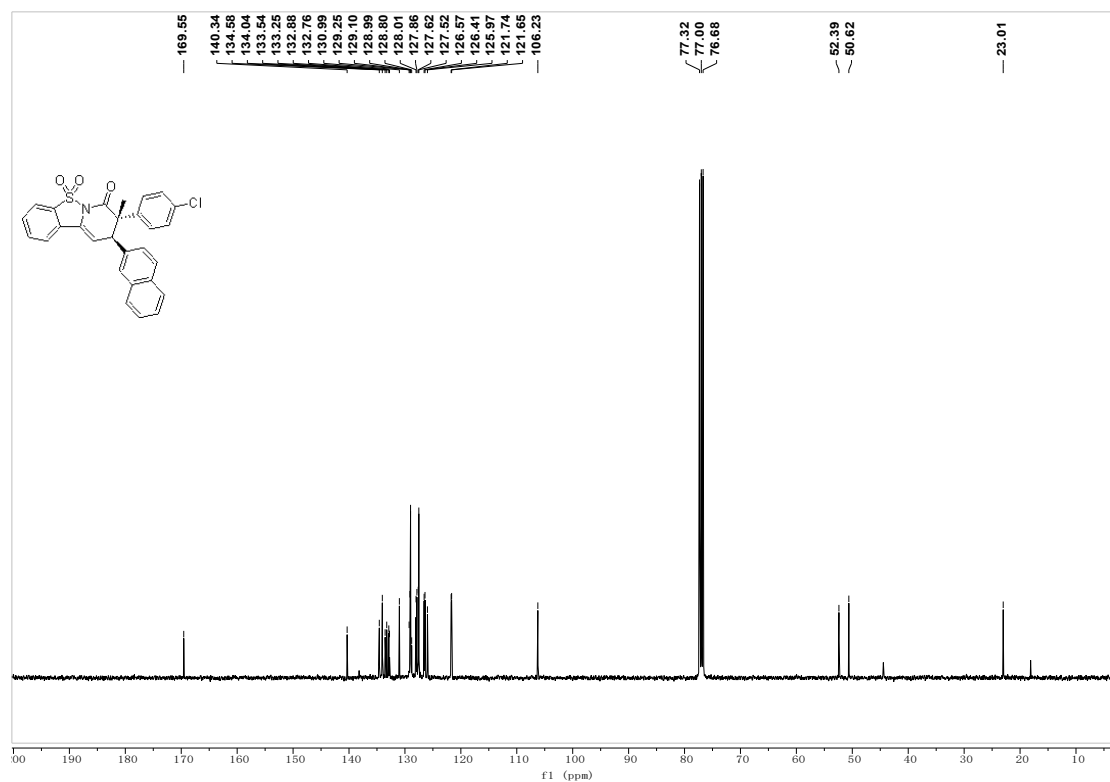
$^{13}\text{C}$  NMR spectrum of compound (**3p**)



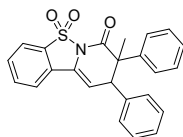
<sup>1</sup>H NMR spectrum of compound (3q)



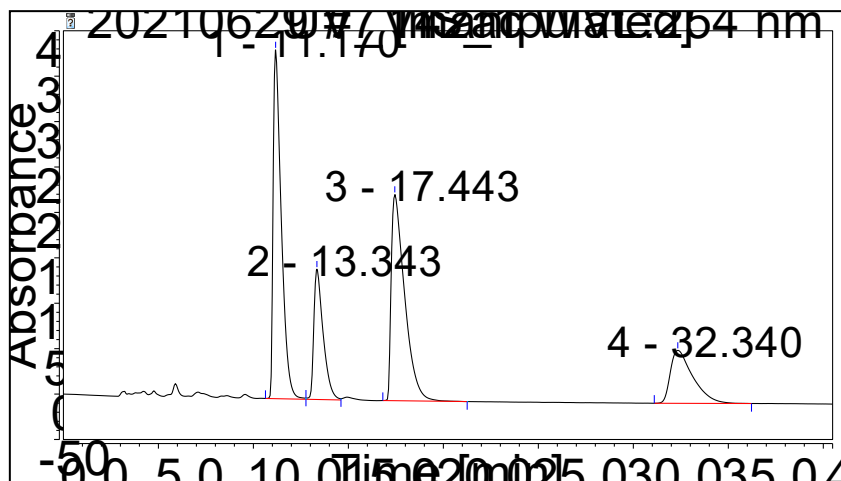
<sup>13</sup>C NMR spectrum of compound (3q)



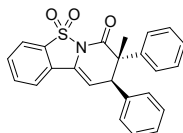
## 6. HPLC Spectra of Compounds 3a–3q



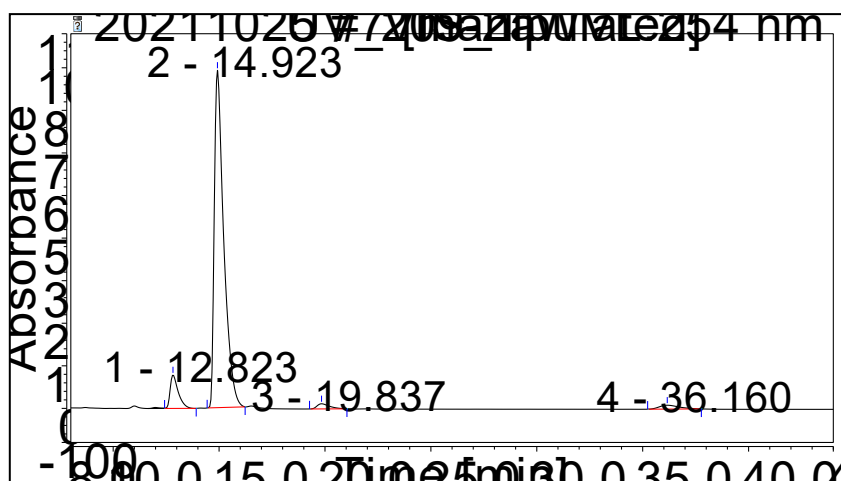
rac 3a



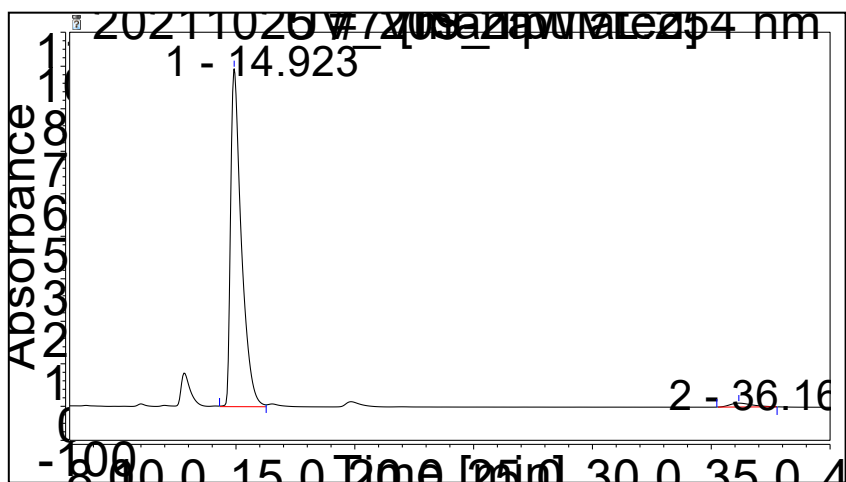
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	11.170	191.525	384.034	35.54
2	13.343	81.793	143.519	15.18
3	17.443	185.704	227.094	34.46
4	32.340	79.930	58.289	14.83



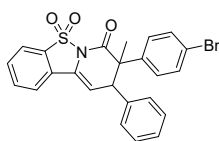
3a



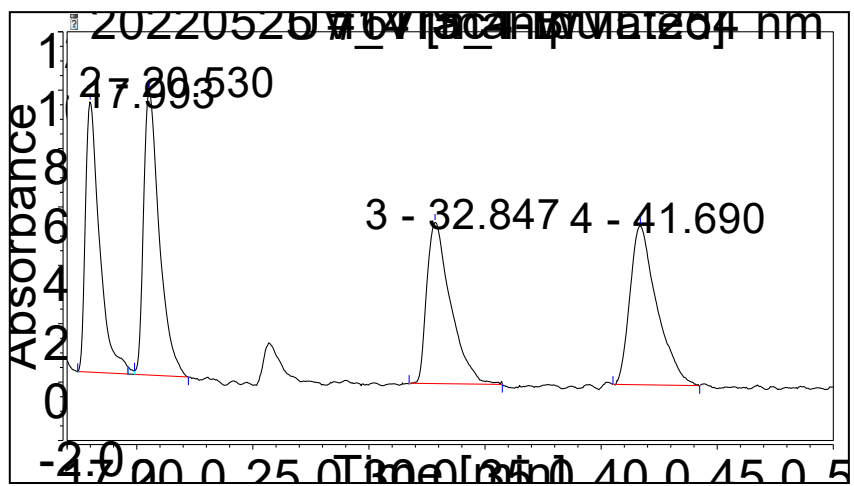
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	12.823	43.213	98.506	7.44
2	14.923	514.830	990.457	88.64
3	19.837	10.348	15.108	1.78
4	36.160	12.417	11.354	2.14



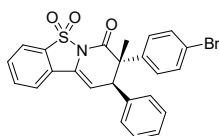
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	14.923	522.430	993.631	97.68
2	36.160	12.417	11.354	2.32



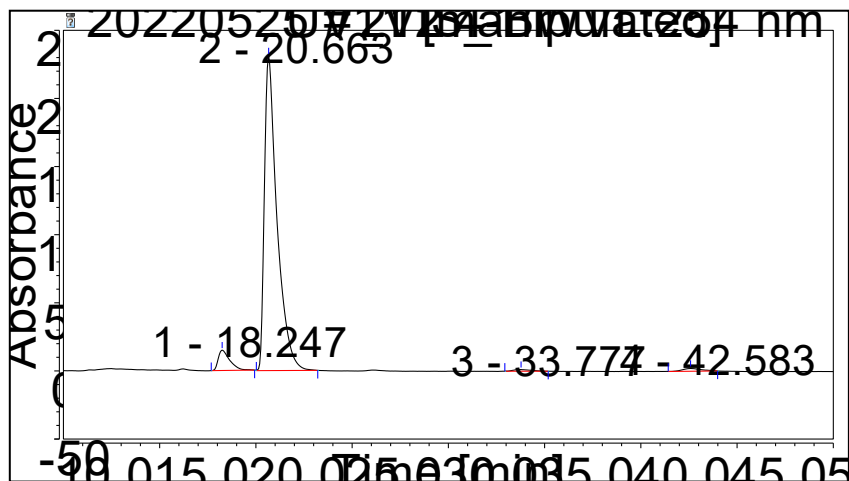
rac 3b



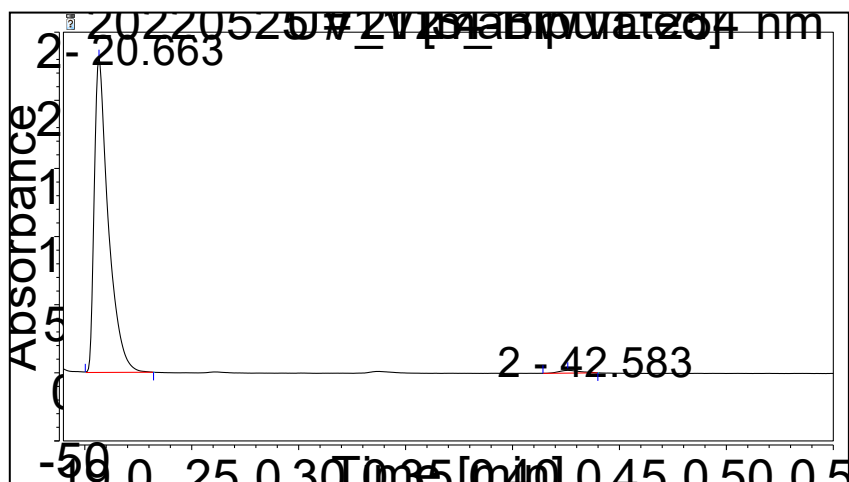
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	17.993	6.557	9.264	23.38
2	20.530	7.646	9.758	27.26
3	32.847	6.548	5.529	23.34
4	41.690	7.301	5.444	26.03



3b

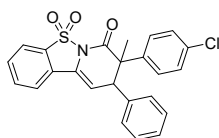


Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	18.247	10.350	14.944	5.47
2	20.663	175.374	230.960	92.63
3	33.777	1.292	1.231	0.68
4	42.583	2.321	2.035	1.23

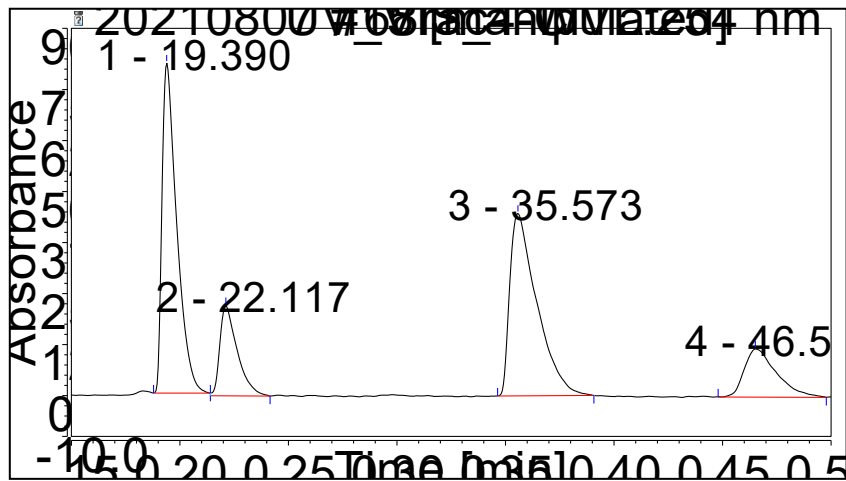


Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	20.663	175.374	230.960	98.69
2	42.583	2.321	2.035	1.31

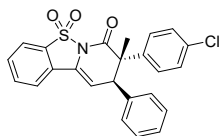




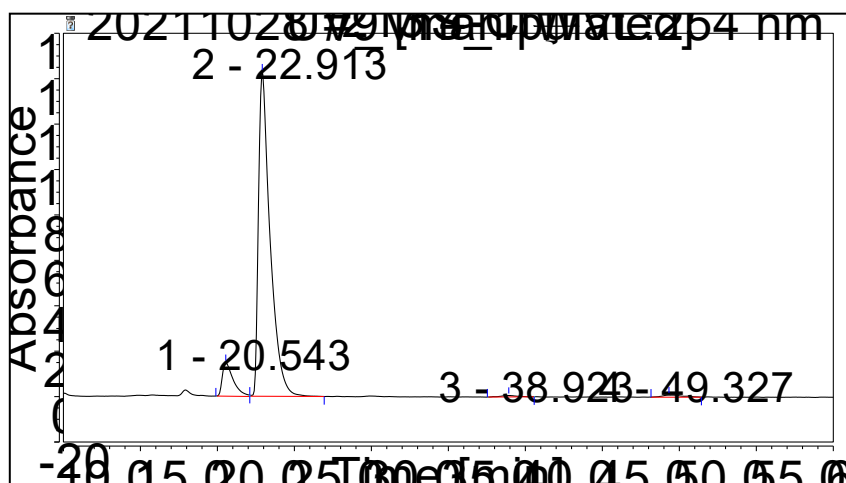
rac 3c



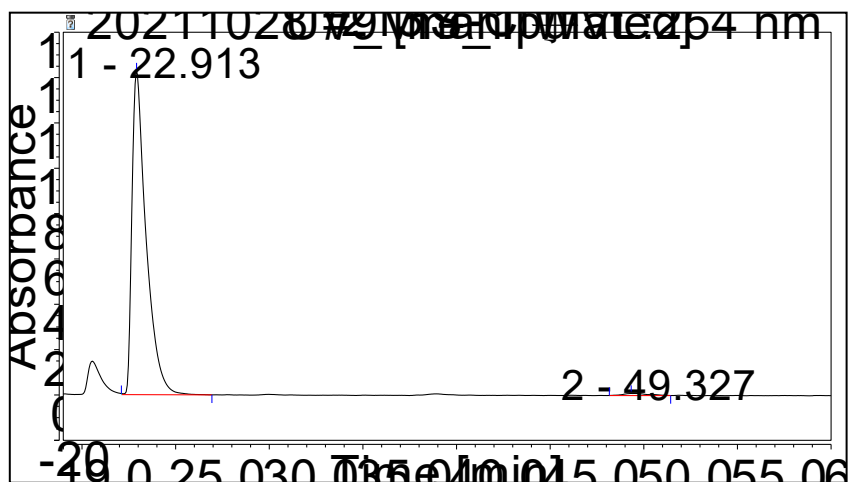
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	19.390	63.808	80.873	37.73
2	22.117	20.515	22.097	12.13
3	35.573	64.403	44.718	38.08
4	46.510	20.391	11.816	12.06



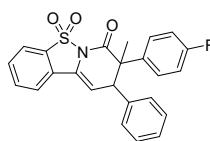
3c



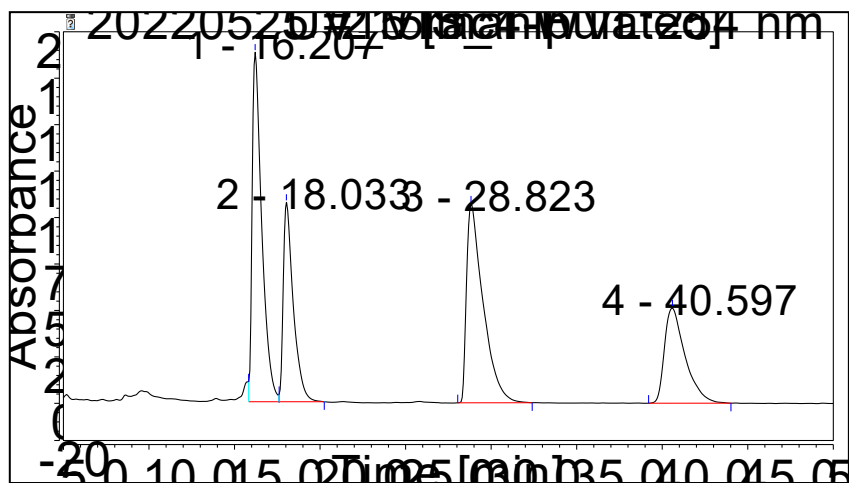
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	20.543	12.156	14.760	8.71
2	22.913	125.212	142.766	89.68
3	38.923	0.761	0.635	0.54
4	49.327	1.497	0.927	1.07



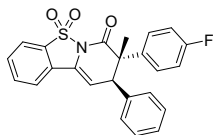
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	22.913	125.212	142.766	98.82
2	49.327	1.497	0.927	1.18



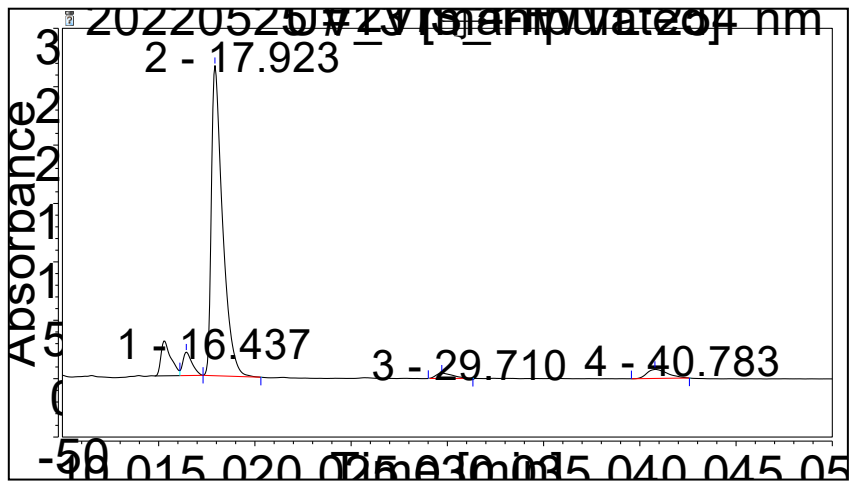
rac 3d



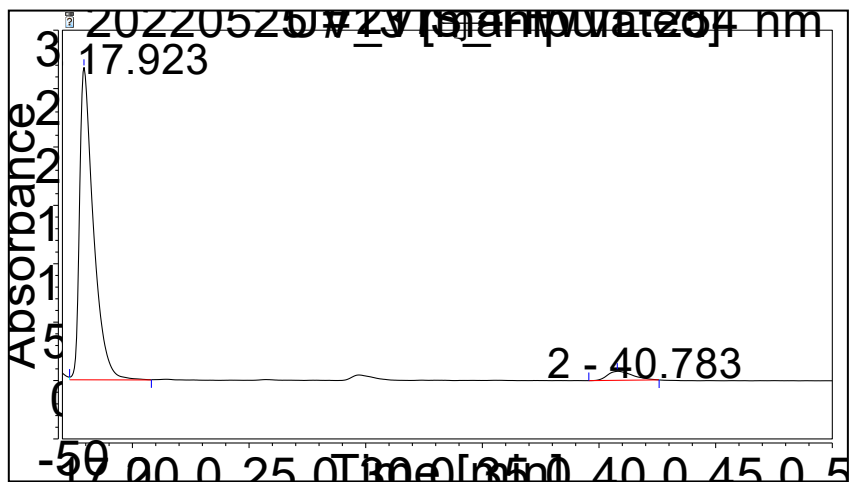
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	16.207	123.179	188.131	31.73
2	18.033	73.187	107.301	18.85
3	28.823	120.255	106.963	30.97
4	40.597	71.631	51.253	18.45



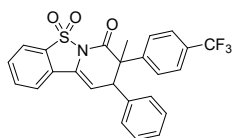
3d



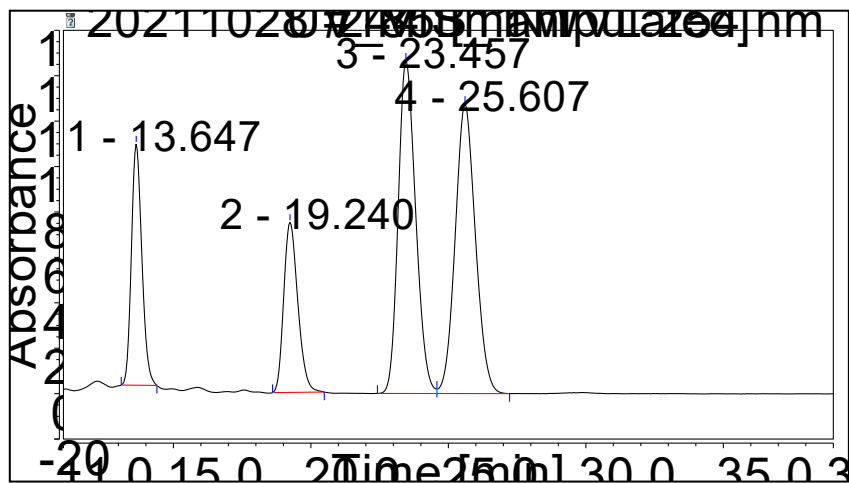
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	16.437	11.200	20.112	5.46
2	17.923	179.795	265.584	87.59
3	29.710	4.663	4.563	2.27
4	40.783	9.612	7.749	4.68



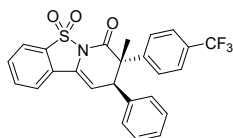
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	17.923	184.379	267.472	95.04
2	40.783	9.612	7.749	4.96



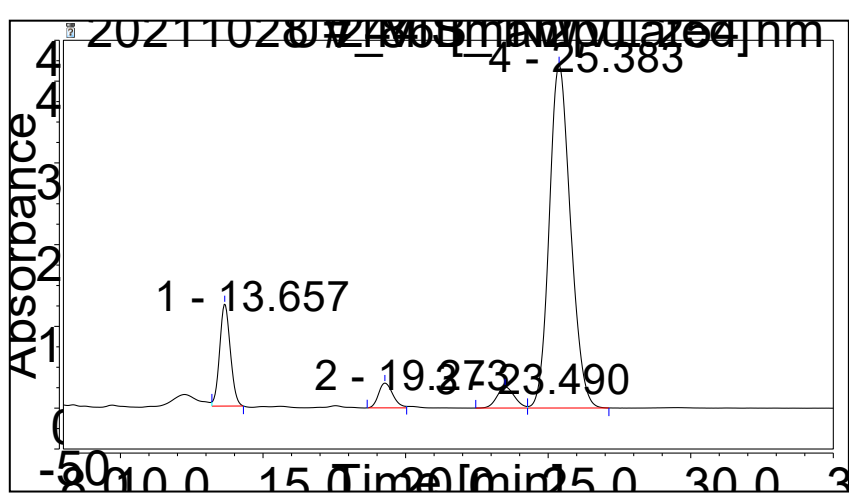
rac 3e



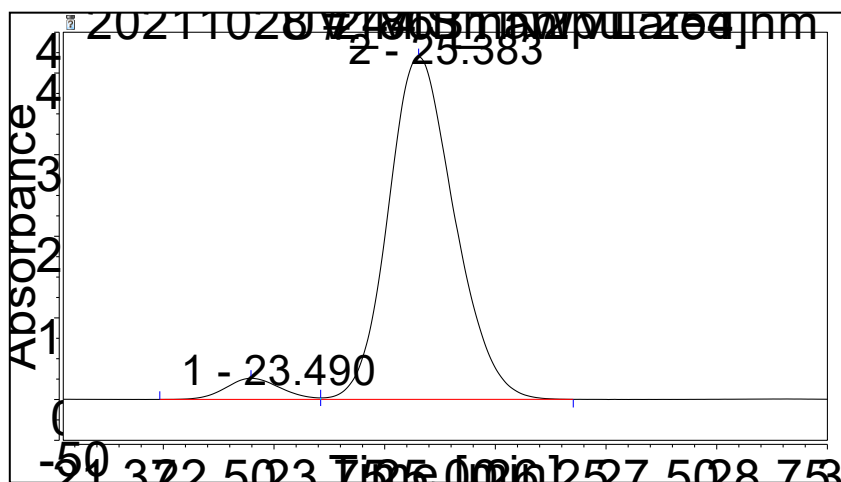
Peak Name	Retention Time (min)	Area (mAU*min)	Height (mAU)	Relative Area (%)
1	13.647	46.799	106.190	15.20
2	19.240	44.431	74.895	14.43
3	23.457	107.958	146.328	35.06
4	25.607	108.711	127.394	35.31



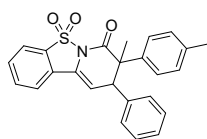
3e



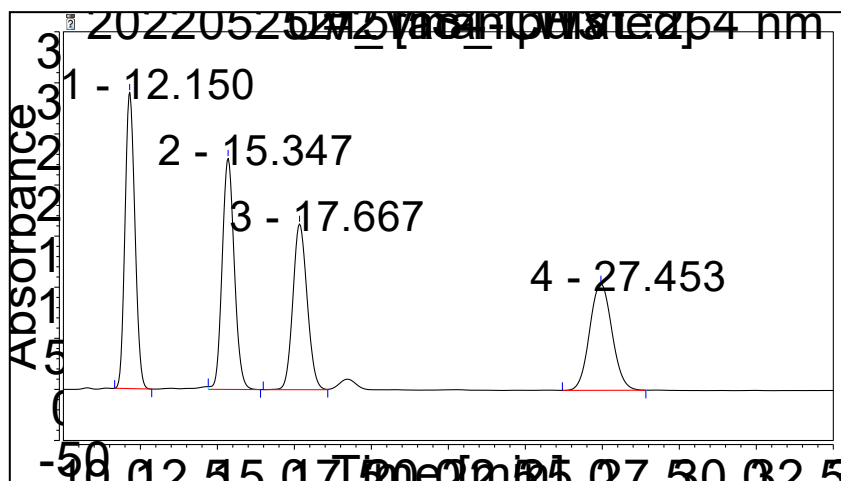
Peak Name	Retention Time (min)	Area (mAU*min)	Height (mAU)	Relative Area (%)
1	13.657	54.290	125.117	11.95
2	19.273	17.680	30.292	3.89
3	23.490	18.374	25.861	4.04
4	25.383	364.008	419.816	80.12



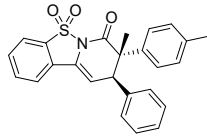
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	23.490	18.374	25.861	4.81
2	25.383	364.008	419.816	95.19



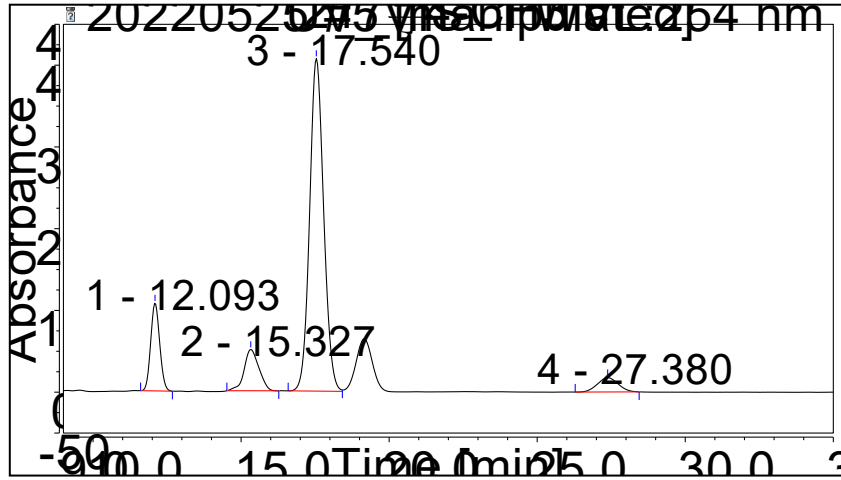
*rac* 3f



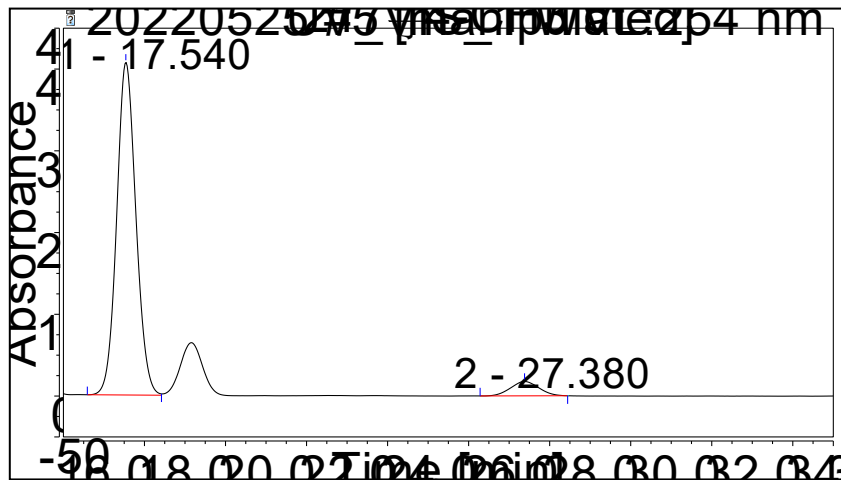
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	12.150	108.082	290.035	27.98
2	15.347	103.294	226.439	26.74
3	17.667	87.314	162.319	22.60
4	27.453	87.609	104.219	22.68



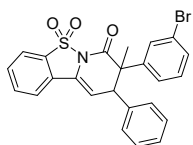
3f



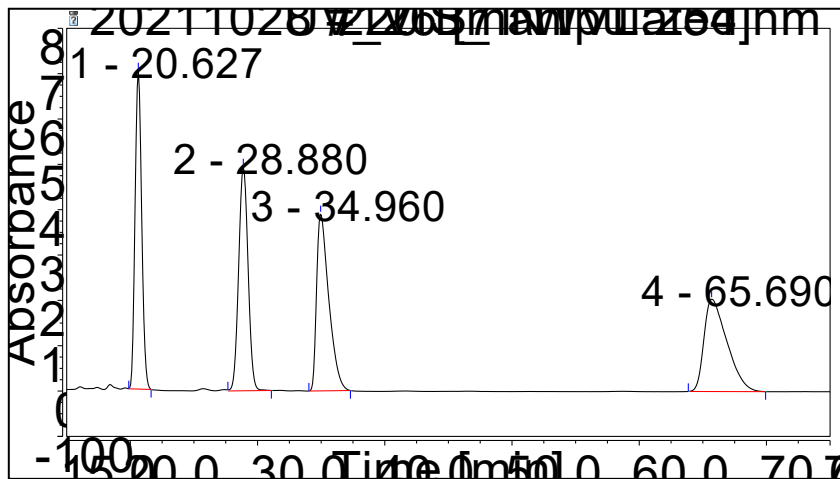
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	12.093	37.861	107.617	12.41
2	15.327	29.165	50.540	9.56
3	17.540	223.815	407.029	73.39
4	27.380	14.124	17.605	4.63



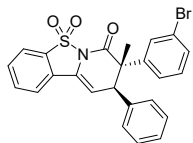
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	17.540	223.815	407.029	94.06
2	27.380	14.124	17.605	5.94



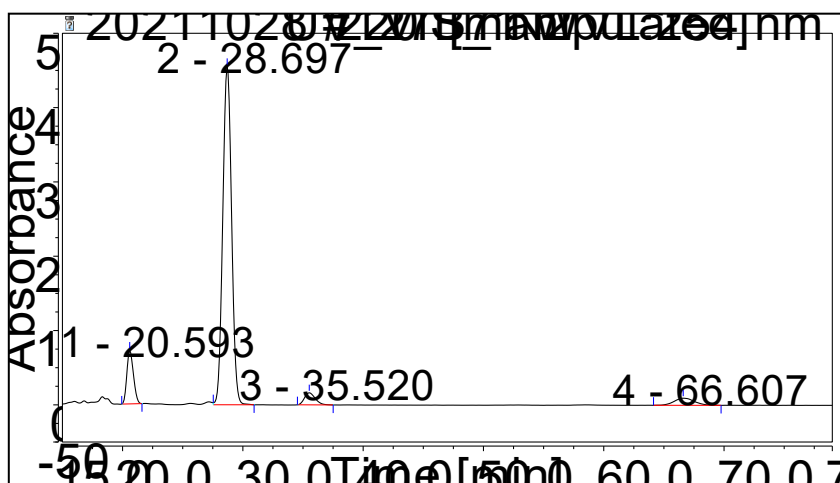
rac 3g



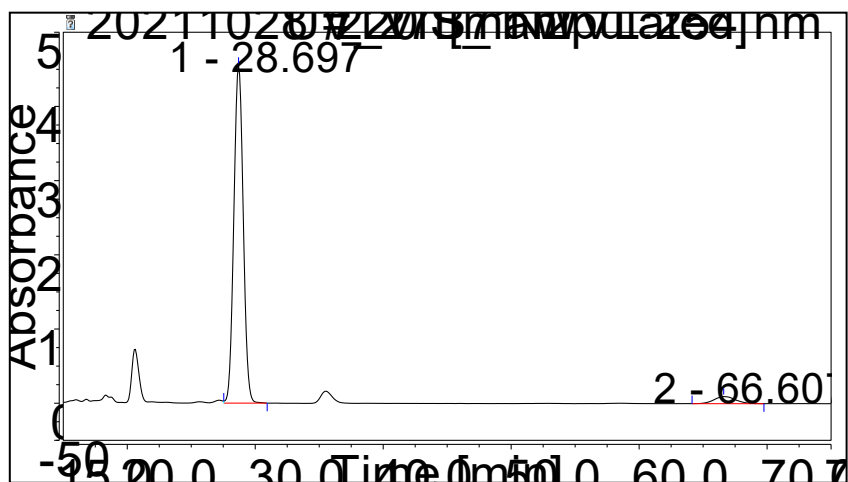
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	20.627	423.382	701.828	24.85
2	28.880	422.952	493.822	24.82
3	34.960	432.226	390.654	25.37
4	65.690	425.446	203.750	24.97



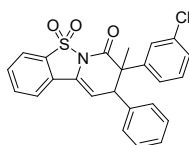
3g



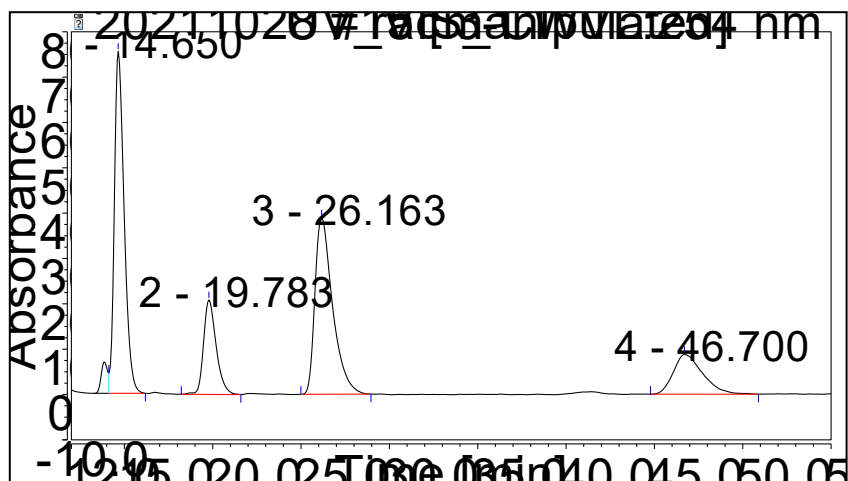
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	20.593	45.305	72.296	9.69
2	28.697	386.920	455.160	82.72
3	35.520	16.783	16.228	3.59
4	66.607	18.713	9.575	4.00



Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	28.697	386.920	455.160	95.39
2	66.607	18.713	9.575	4.61

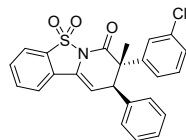


rac 3h

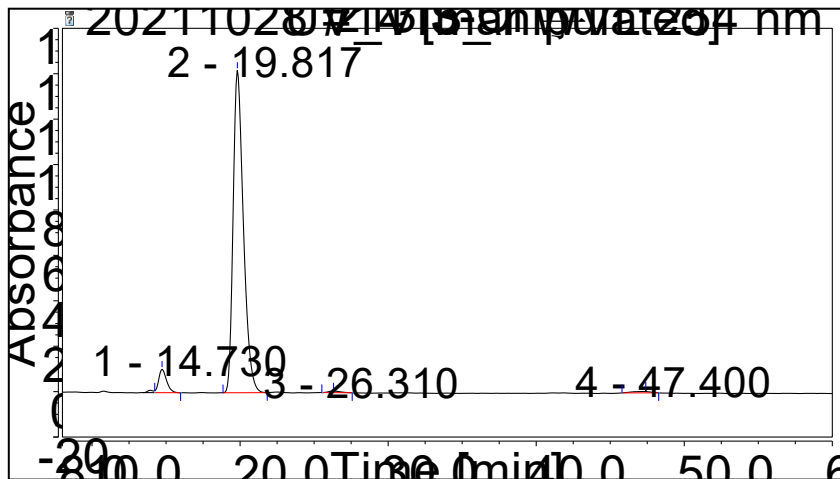


Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	14.650	48.469	75.403	37.95
2	19.783	17.258	20.854	13.51
3	26.163	45.042	38.861	35.27
4	46.700	16.944	8.765	13.27

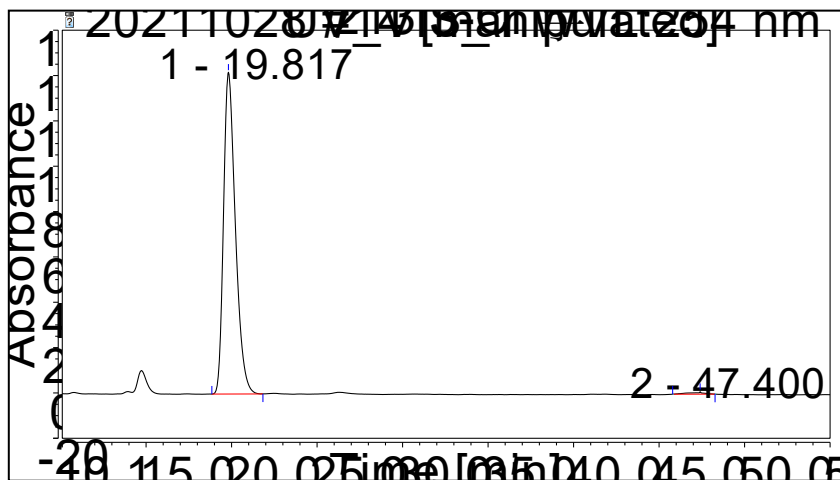




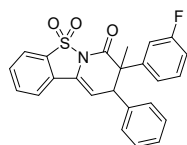
3h



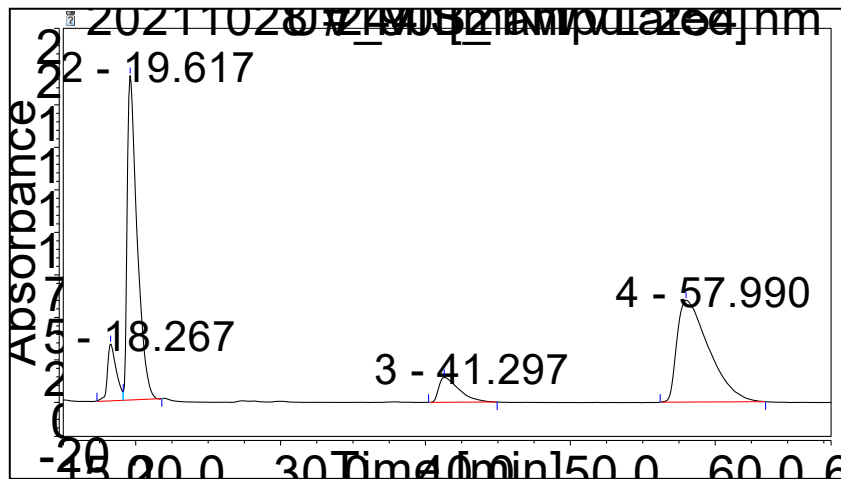
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	14.730	6.309	10.346	5.17
2	19.817	114.152	141.958	93.57
3	26.310	0.642	0.717	0.53
4	47.400	0.893	1.187	0.73



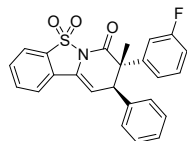
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	19.817	114.152	141.958	99.22
2	47.400	0.893	1.187	0.78



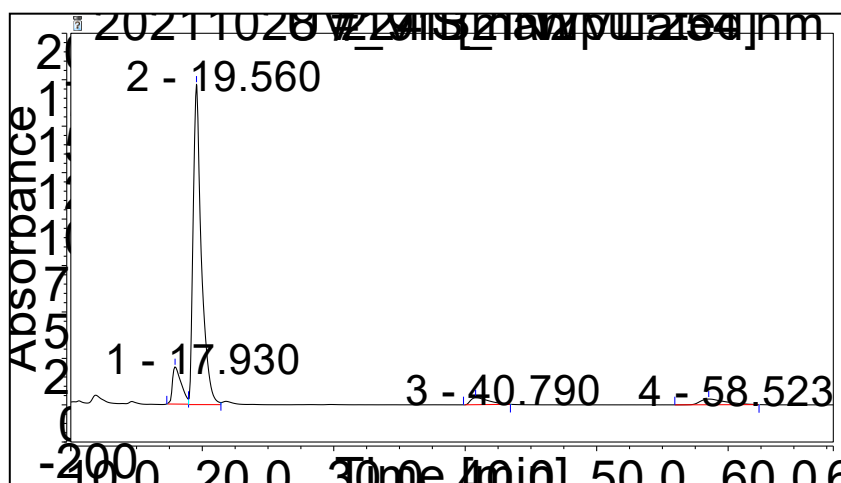
rac 3i



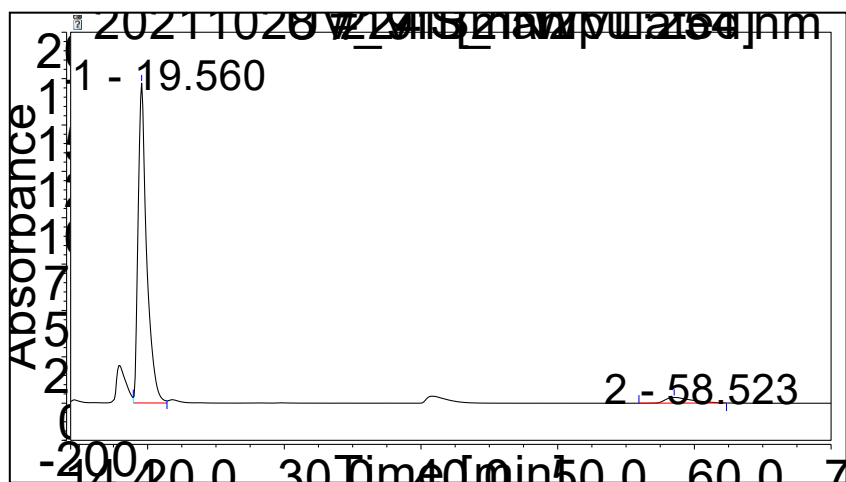
Integration Results				
Peak Name	Retention Time (min)	Area (mAU*min)	Height (mAU)	Relative Area (%)
1	18.267	23.710	33.584	6.74
2	19.617	151.894	190.769	43.19
3	41.297	23.601	14.609	6.71
4	57.990	152.446	59.909	43.35



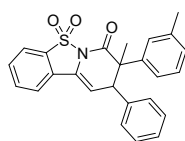
3i



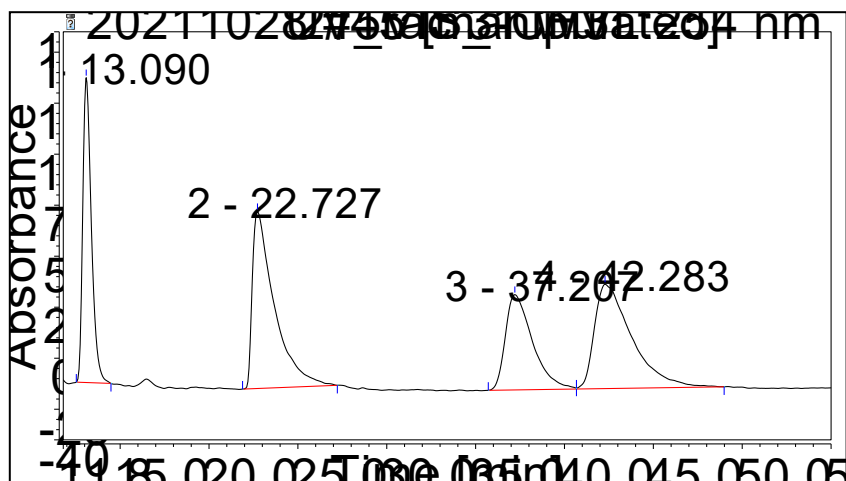
Integration Results				
Peak Name	Retention Time (min)	Area (mAU*min)	Height (mAU)	Relative Area (%)
1	17.930	156.148	200.531	10.17
2	19.560	1251.650	1724.527	81.53
3	40.790	58.880	36.918	3.84
4	58.523	68.549	30.524	4.47



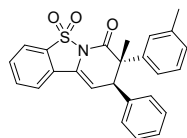
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	19.560	1251.650	1724.527	94.81
2	58.523	68.549	30.524	5.19



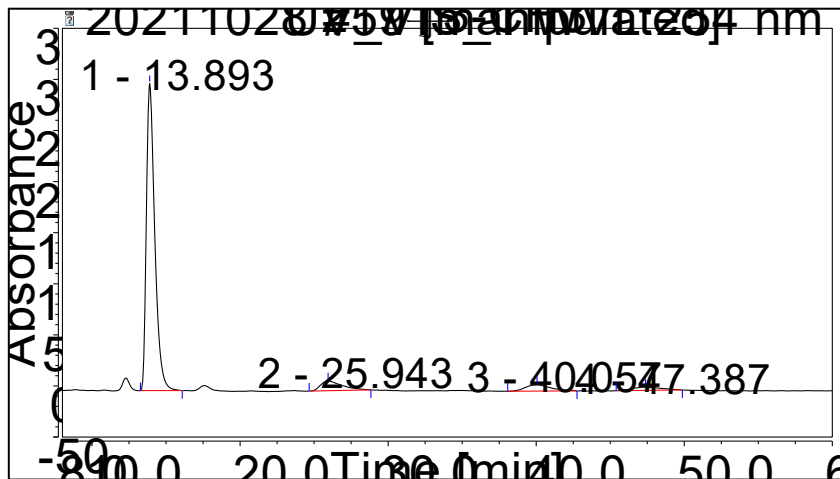
rac 3j



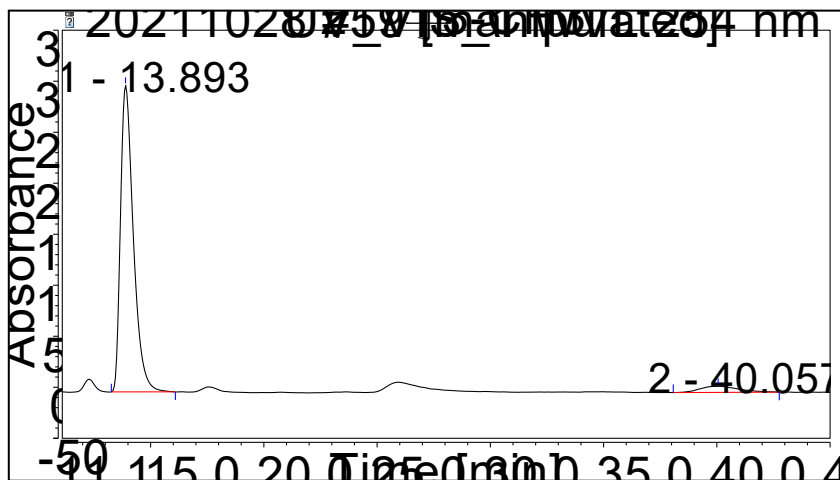
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	13.090	84.088	149.412	20.25
2	22.727	124.544	86.727	29.99
3	37.207	82.381	46.740	19.84
4	42.283	124.236	51.148	29.92



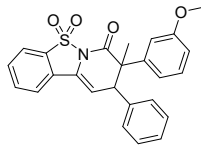
3j



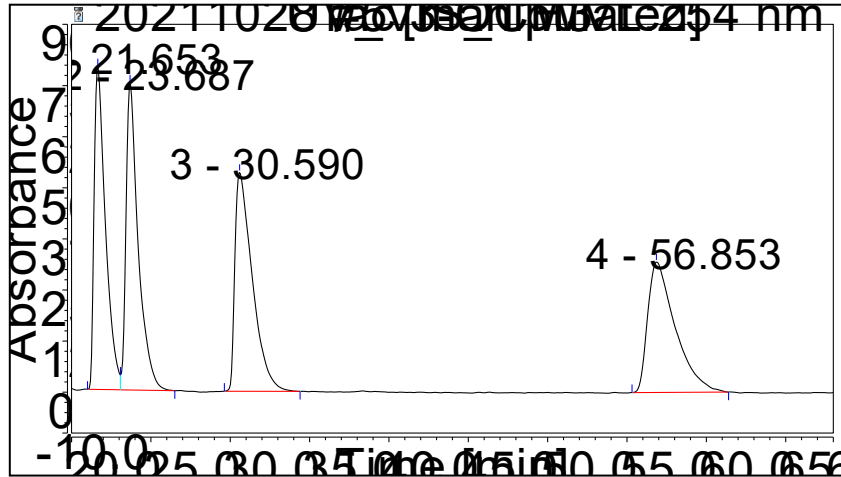
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	13.893	197.706	300.436	84.94
2	25.943	16.121	9.606	6.93
3	40.057	11.943	5.940	5.13
4	47.387	7.002	3.048	3.01



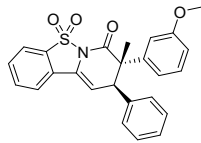
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	13.893	197.706	300.436	94.30
2	40.057	11.943	5.940	5.70



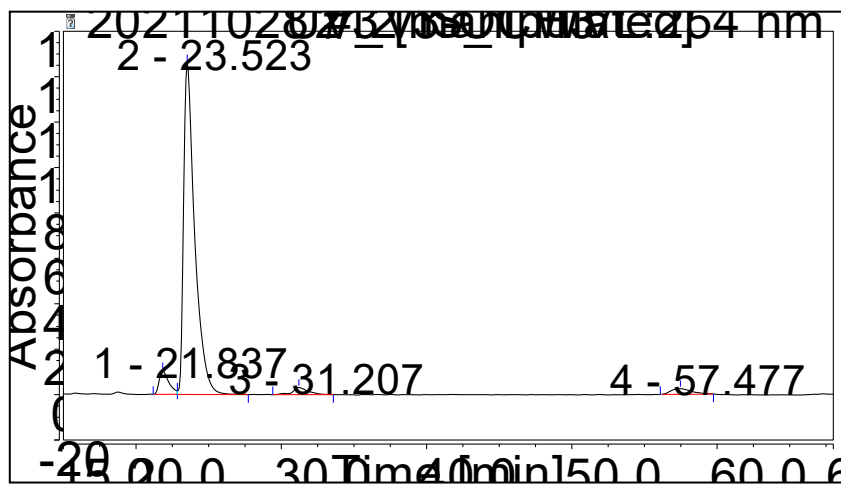
rac 3k



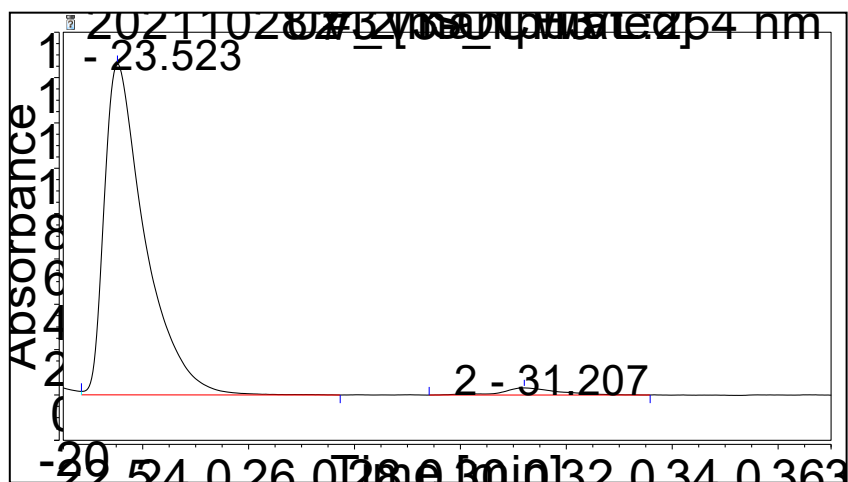
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	21.653	65.526	78.942	24.77
2	23.687	66.847	75.129	25.27
3	30.590	67.994	53.550	25.71
4	56.853	64.127	31.927	24.25



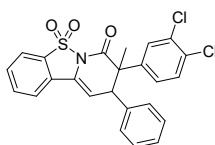
3k



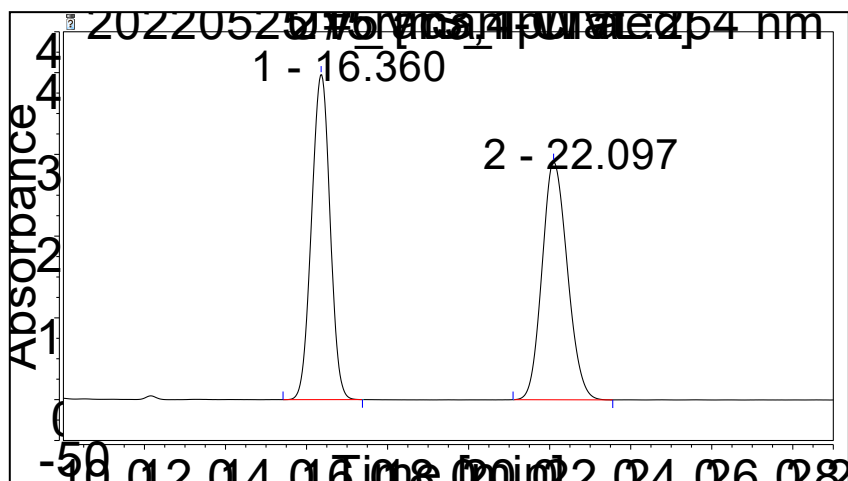
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	21.837	8.036	10.398	5.51
2	23.523	129.885	146.099	89.02
3	31.207	3.882	3.138	2.66
4	57.477	4.096	2.500	2.81



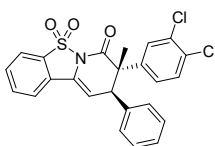
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	23.523	129.885	146.099	97.10
2	31.207	3.882	3.138	2.90



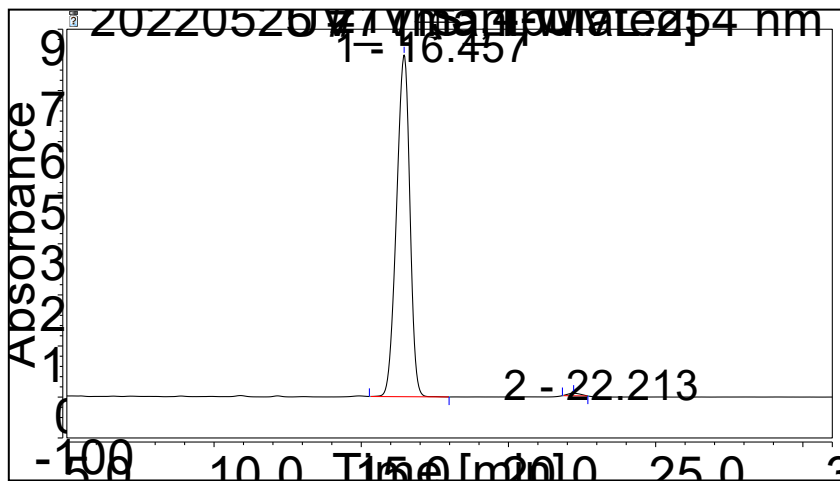
rac 3I



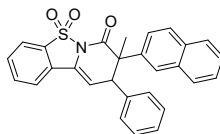
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	16.360	210.361	398.104	49.95
2	22.097	210.757	291.134	50.05



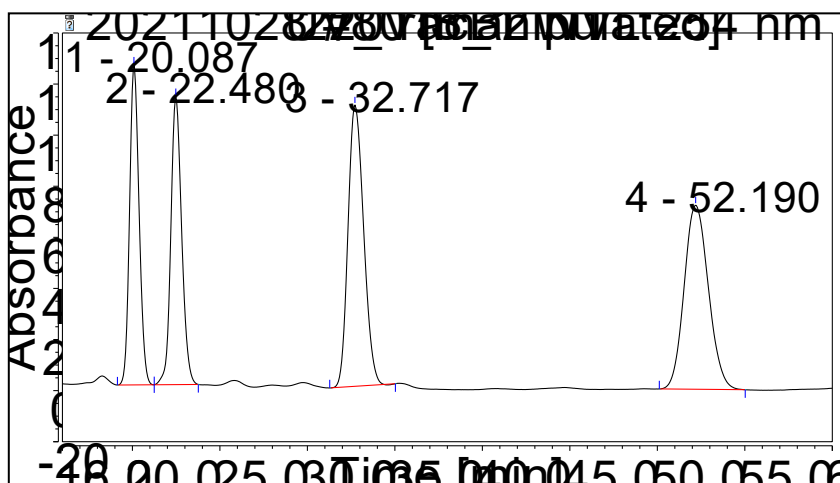
3I



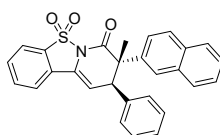
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	16.457	439.805	836.251	99.29
2	22.213	3.130	6.193	0.71



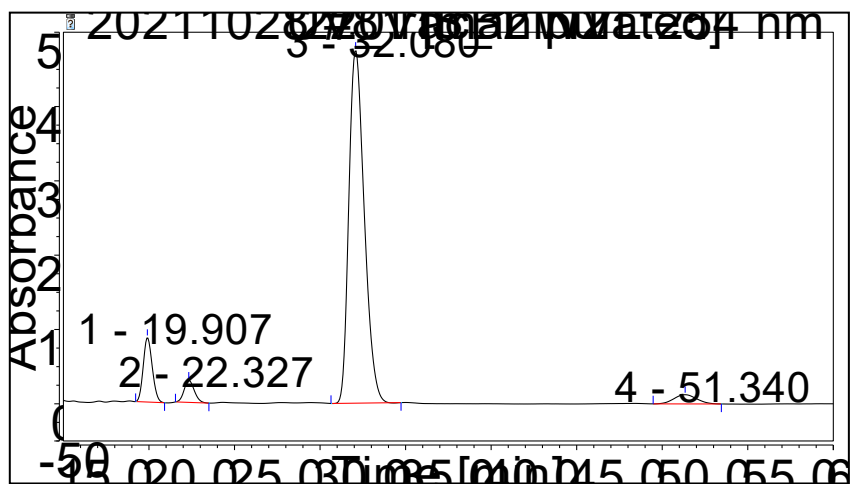
rac 3m



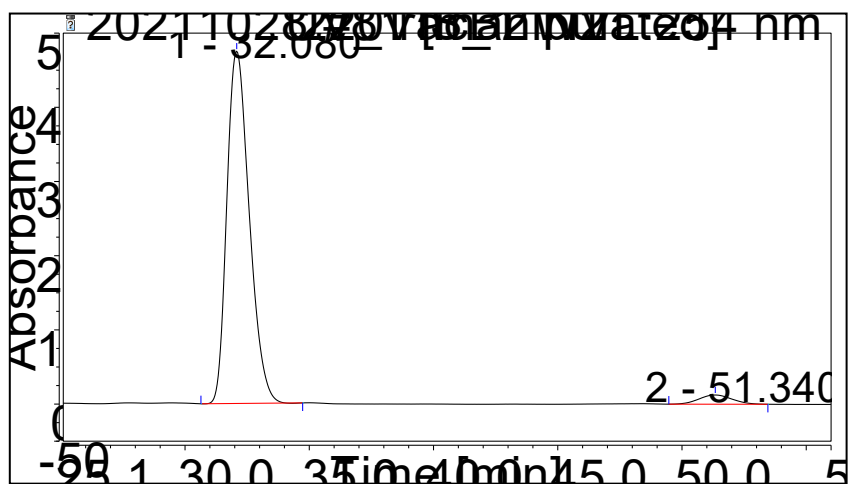
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	20.087	78.899	125.200	20.28
2	22.480	80.726	112.723	20.75
3	32.717	113.830	110.128	29.25
4	52.190	115.640	72.063	29.72



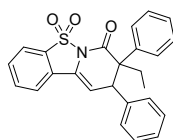
3m



Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	19.907	52.833	86.882	8.98
2	22.327	20.623	29.878	3.50
3	32.080	495.974	474.868	84.27
4	51.340	19.124	12.398	3.25

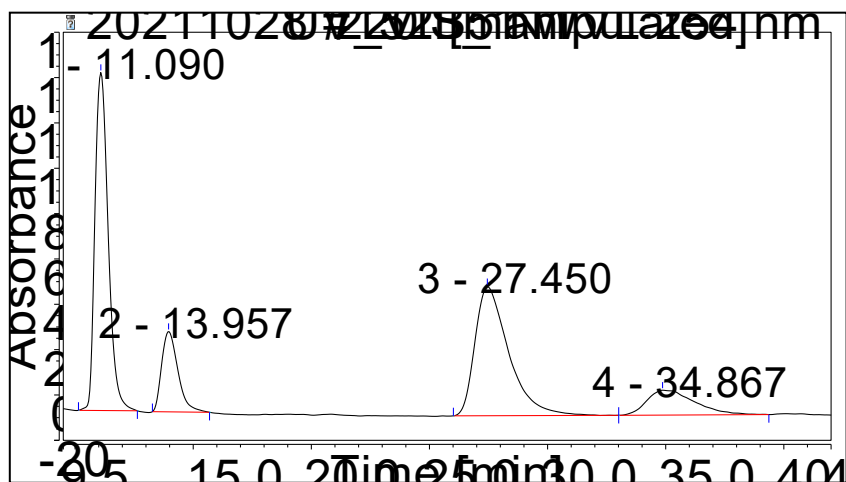


Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	32.080	495.974	474.868	96.29
2	51.340	19.124	12.398	3.71

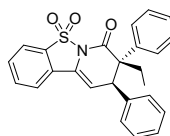


rac 3n

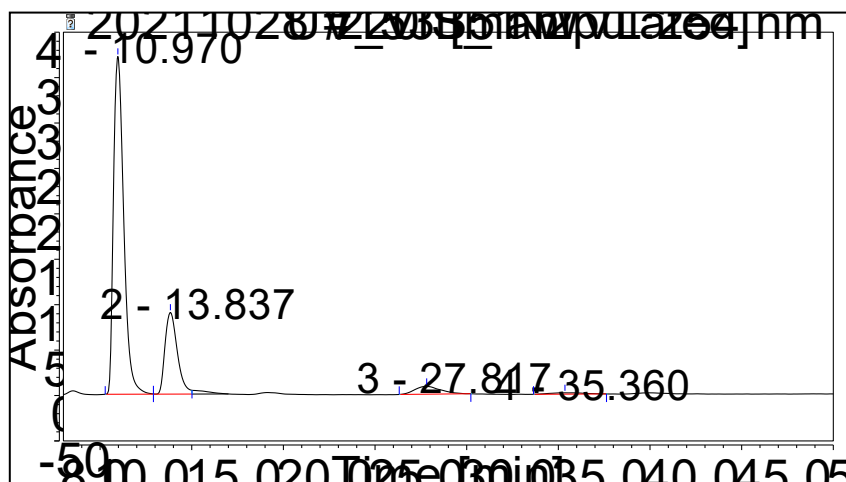




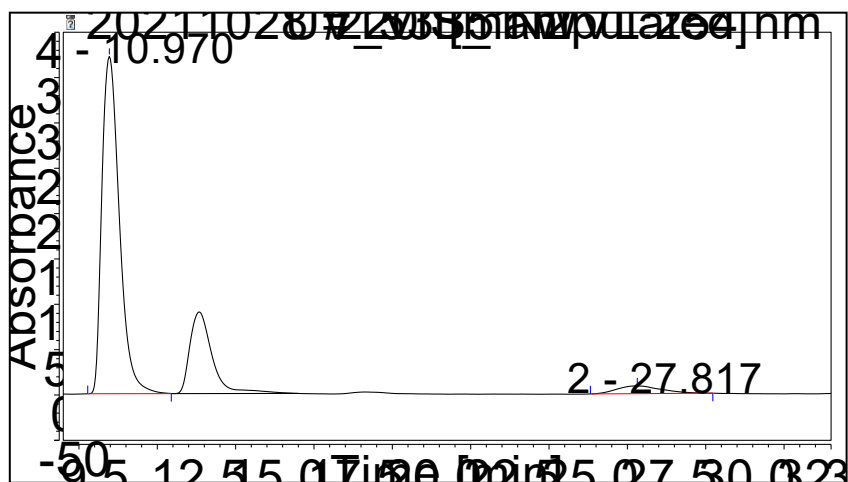
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	11.090	96.942	149.113	39.56
2	13.957	28.260	35.449	11.53
3	27.450	94.045	56.937	38.38
4	34.867	25.793	10.976	10.53



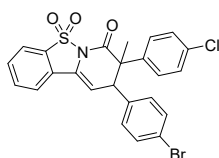
3n



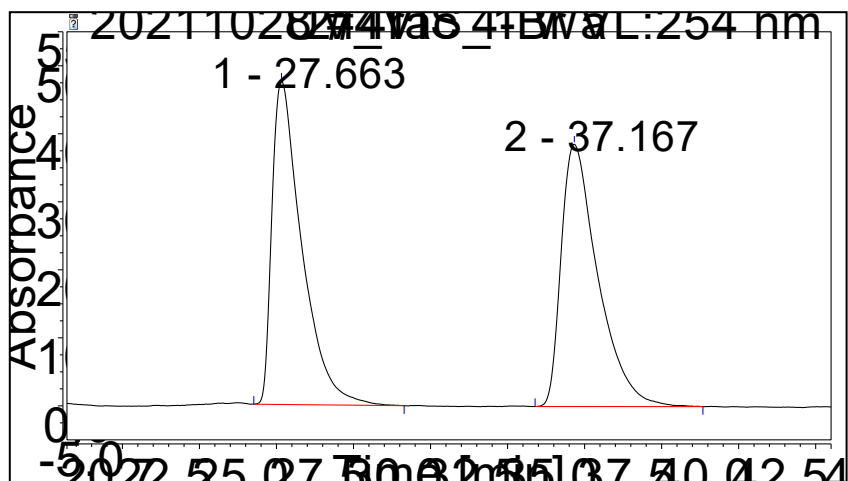
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	10.970	241.014	371.889	73.44
2	13.837	70.026	90.101	21.34
3	27.817	13.959	8.455	4.25
4	35.360	3.172	1.438	0.97



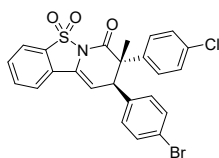
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	10.970	241.020	371.889	94.53
2	27.817	13.959	8.455	5.47



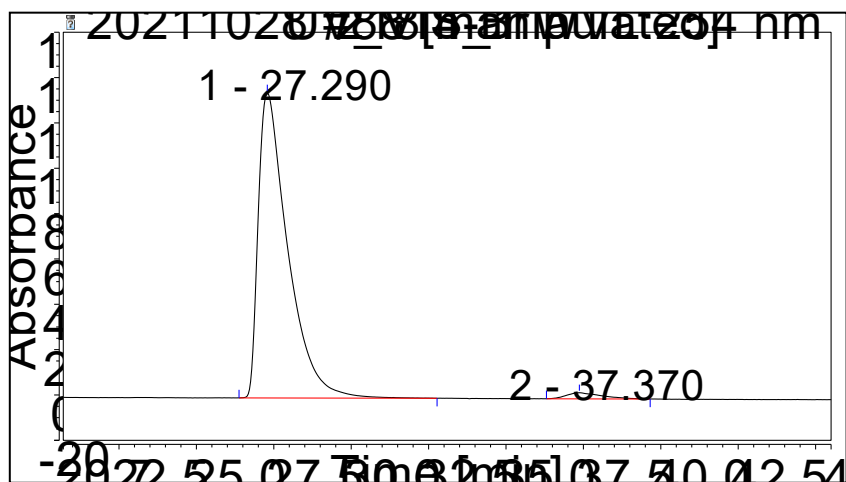
rac 3o



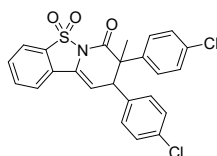
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	27.663	53.423	47.553	50.08
2	37.167	53.250	38.574	49.92



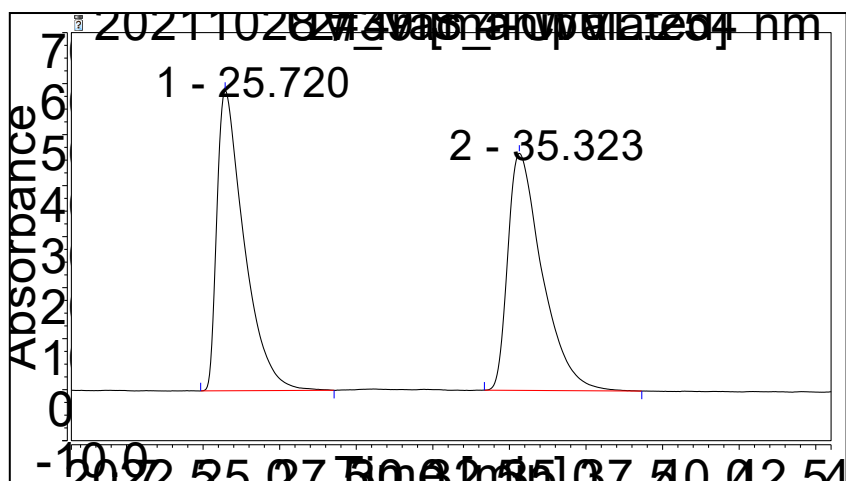
3o



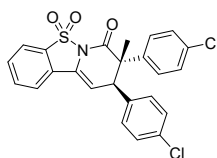
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	27.290	148.615	134.614	97.66
2	37.370	3.555	2.712	2.34



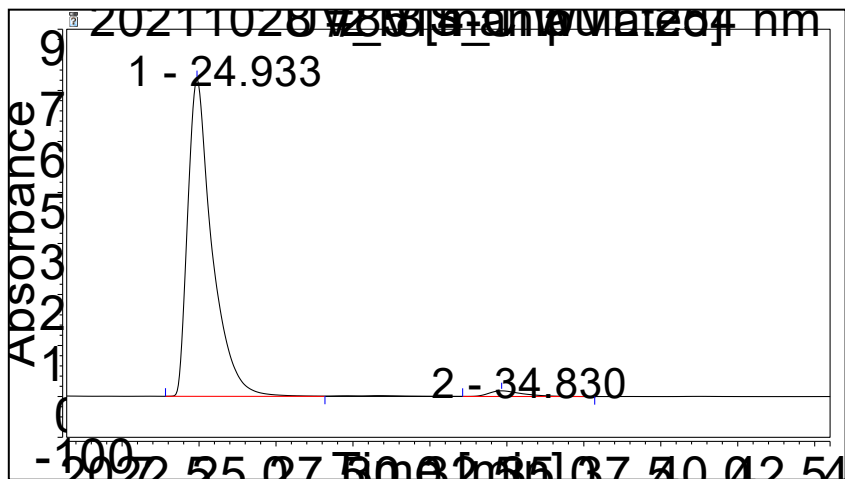
*rac* 3p



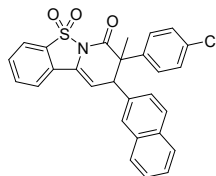
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	25.720	60.538	58.889	50.13
2	35.323	60.223	46.479	49.87



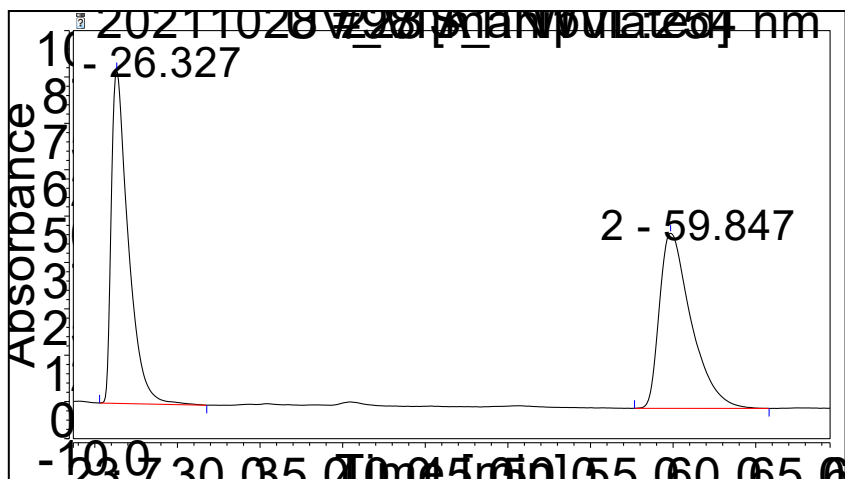
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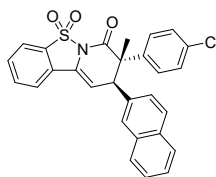
Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	24.933	712.110	778.337	97.59
2	34.830	17.600	13.840	2.41



rac 3q



Integration Results				
Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %
1	26.327	107.166	89.708	50.53
2	59.847	104.931	47.199	49.47



3q

